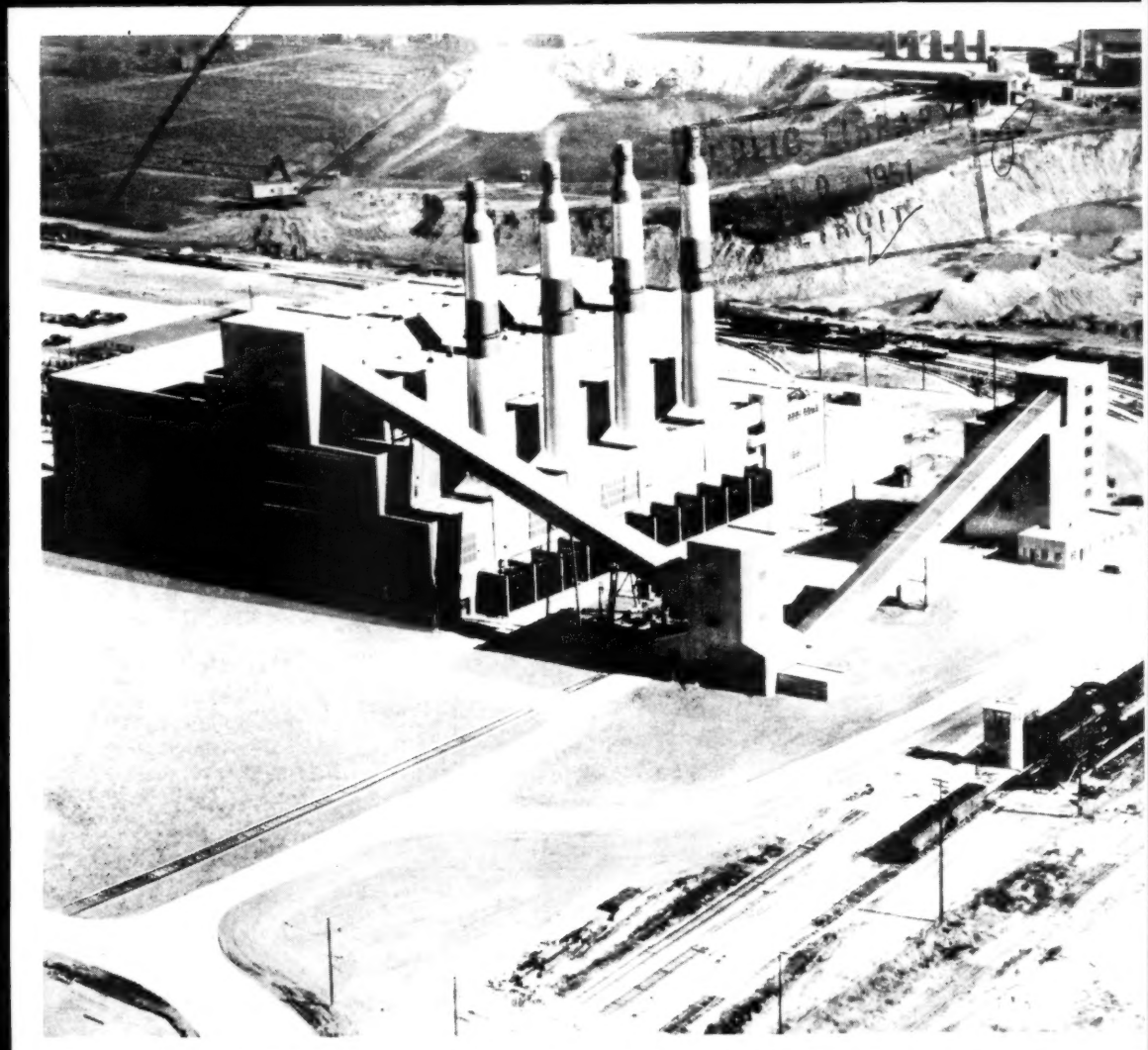
Midwest Engineer



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84 E. Randolph Street
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MIDWEST ENGINEER

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WESTERN SOCIETY OF ENGINEERS

Serving the Engineering Profession

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COVER CREDIT

This month's cover shows an aerial view of Commonwealth Edison's new Ridgeland Generating Station. Ridgeland's unusual size and technical features are described in this issue.

Meetings begin at 7 p. m. unless otherwise indicated. There will be a short film before the speakers at the Monday night general meetings.

January 8, Employment Situation

SPONSORED BY THE BRIDGE & STRUCTURAL AND TRANSPORTATION ENGINEERING SECTIONS

"Employment and Advancement Opportunities of Engineers" will be the subject of this panel discussion of definite value to engineers of all ages. The panel will be composed of five outstanding educational and business leaders from the Chicago area: **Henry T. Heald** (WSE), president of Illinois Institute of Technology; **John F. Seifried,** district manager of Ceco Steel Products Company; **Jay Hunter,** personnel manager of Illinois Bell Telephone Company; **Dr. Gustav Egloff** (WSE), director of research, Universal Oil Products Company; and **H. P. Sedwick** (WSE), vice-president of the Public Service Company of Northern Illinois.

The junior and student members will be prepared with questions to insure a lively and instructive discussion.

January 10, Third Profits Seminar

SPONSORED BY THE JUNIOR DIVISION

Mr. K. V. Zwiener, vice-president of Harris Trust Company will be the guest speaker when the Junior Division meets on Wednesday, January 10, at 7 p.m. for their panel discussion on "Profits and Survival." The title of this third in a series of four seminars is "What Is the Function of Investment in Our Economy?" The profits seminars have all been moderated by **Daniel K. Chinlund** (WSE), of Illinois Bell.

January 13, Video Station Excursion

NBC television studios will be the site of the next WSE excursion. Members and guests will meet at 1:30 p.m. and tour until 4 p.m.

The tour will be divided into two parts, one to start at the TV studios in the Merchandise Mart, 20th floor, and the other at the Transmitter in the Civic Opera Building. The two groups will switch when the first part of their tour is over.

The excursion will include a closeup view of the equipment in studios and the master control room, rehearsals in progress and the transmitter equipment. For reservations call RA 6-1736.

January 15, Quality Control

SPONSORED BY THE COMMUNICATIONS ENGINEERING SECTION

Arthur G. Dalton, superintendent of Quality Control with Western Electric Company, will speak on "Specification, Measurement and Control of Quality." Mr. Dalton's talk will include the fundamental concepts of quality control as they relate to the satisfactoriness of a product and its cost.

Born and educated in England, Mr. Dalton has been identified with quality control throughout his long Bell System career. He joined Western Electric in 1921, going to Bell Laboratories as System's Quality Engineer and returning to Western Electric in 1943 as superintendent of Quality Control. The meeting will be preceded by two short films on related subjects.

January 22, Atomic Energy vs. Solar Energy

SPONSORED BY THE CHEMICAL AND METALLURGICAL ENGINEERING SECTION

The tentative subject of Professor Farrington Daniels' talk before the Chemical and Metallurgical section will be "Atomic Energy vs. Solar Energy." Mr. Farrington is a professor of Chemical Engineering at the University of Wisconsin, and a member of the advisory committee on chemistry for the U. S. Atomic Energy Commission. He has served as director of the Metallurgical Laboratory, Argonne National Laboratory and chairman of the Board of Governors of Argonne.

January 29, Color in Engineering

SPONSORED BY THE PROFESSIONAL WOMEN'S COUNCIL

Mr. Egbert Jacobson will speak on "Color," emphasizing the importance of color in engineering and architectural problems. Mr. Jacobson, director of the Department of Design of the Container Corporation of America, is in charge of graphic presentation, printing and interior architecture for the company. He is a widely known authority in the field of "color" having been interested in its study since 1927. He is the author of the "Color Harmony Manual" and "Basic Color."

Mr. Jacobson's talk will be illustrated with slides and exhibits.

February 5, Underground Corrosion

SPONSORED BY GAS, FUELS AND COMBUSTION AND CHEMICAL AND METALLURGICAL ENGINEERING SECTIONS

Mr. M. G. Markle, gas engineer of the Public Service Company of Northern Illinois, will speak on the "Corrosion of Underground Structures." He will discuss, generally, some of the causes of corrosion of buried metals and related methods currently employed to mitigate and control corrosion of underground piping systems. Corrosion is a major problem of industry, and Mr. Markle's talk should be of interest to all engineers.

February 7, Final Profits Seminar

SPONSORED BY THE JUNIOR DIVISION

"What is the Role of Government in Our Economy?" is the tentative topic for the last in a series of four seminar type discussions on "Profits and Survival. **Daniel K. Chinlund** is the moderator.

(*Continued on Page* 23)

Many Members Make Headquarters A Habit

Why Don't You

WSE quarters is your own private club, with facilities for serving fine meals (in record time if you're in a hurry, at a leisurely pace, if you're not), for relaxing with a cocktail before your meal, or just taking it easy, playing cards or reading magazines in the lounge.

- Relax in the lounge
- Meet your friends
- Lunch leisurely
- Dine with the family
- Use the lounge and dining room for your parties
- Luncheon- 11 a.m.-2 p.m.
- Dinner- 5:30 p.m.-8 p.m.

Use your WSE Headquarters

84 E. Randolph RA 6-1736

Looking Ahead

General Campbell, military man and business man, praises the engineer for his past accomplishments, challenges the engineer to meet his increased responsibilities in the future.

The Author

By General Levin H. Campbell, Executive Vice President, International Harvester

I am a great admirer of engineers. It would be strange if I did not admire men of your profession for I have had the privilege of working closely with engineering people over a good many years, first in the Army and now as a civilian in a large manufacturing organization. By your deeds I have known you.

I am not alone in my admiration. The general standing of the engineer in public esteem has never been higher than at present. The engineer is in many respects the perfect type of Twentieth Century Man. The scientist and the engineer, in the public mind, share a pedestal. They are regarded, and properly so, as men whose special ability is to determine facts and then to devise a course of action which conforms to those facts.

It is not surprising that, in an age when the passions of men have run wild, the dispassionate figure of the engineer should be reassuring to people. This generation has seen two gigantic world wars and the collapse of half the earth into despotism. It has seen economic and political nostrums of every kind put into action.

Emotions have been twisted by such enemies of fact and calm thought as the late Dr. Goebbels in Germany, the unnamed propagandists of Russian communism, and the numerous apologists for socialism, pink, red or magenta.

And so our people have increased their regard for the engineer and the man of science as an anchor of fact in a sea of fraud and fiction.

No one knows, I suppose, when engineering began. Perhaps with the invention of the wheel. Perhaps with the discovery of the principle of the lever. Most of us in my generation had our first contact with it when, in the course of translating Caesar's Gallic War commentaries, we came to the famous passage about the building of the bridge.

Slowly and painfully, log by log and rope by rope, we built that bridge with the Roman engineers. Maybe that is when our respect for engineers began. Any man who could build a bridge was good. But a man who could build one while thinking in Latin must have been a genius.

The earliest engineers were military engineers. They designed fortifications. They designed catapults and other engines to break down those fortifications. They built roads for rapid movement of troops to the frontiers. Chemical warfare probably began with Greek fire.

As civilization advanced, the tasks of the engineer widened. For the kings he served, he built bridges and aqueducts, developed plumbing installations, began to develop heating systems and other things which contributed to health and comfort as well as to military security.

The industrial revolution brought the engineer out of the narrow sphere of military work and royal projects and made him what he is today, a designer for the greater comfort, convenience, safety and wealth of the general public. The modern engineer is in the fullest sense a public servant, regardless of who his employer may be.

Now, great as engineering progress has been, and much as we owe to the engineer, the modern world is far from being the creation of the engineer alone. All the miraculous changes that have been brought about by electricity and by the internal combustion engine and the other great developments of the last

Looking Ahead

(*Continued from Page 4*)

century, required the engineer, but by himself he could not have carried them on.

It is the fashion in many circles now to sneer at the capitalist, to scorn the profit motive, to attack profits themselves as somehow immoral. But the fact remains that we owe our present standard of living to the partnership of two kinds of men—the engineer and the capitalist.

Engineer and Capitalist Work Together

The engineer has provided the machines. But it is the capitalist who has taken them out of the laboratory, provided the men and tools to produce them in quantity, and distributed them to the public after they were produced.

On rare occasions, there has been an engineer who was also an entrepreneur, Cyrus McCormick for one, Thomas Edison for another, but they were not typical. Rudolph Diesel did not successfully market his engine. The engineer and the capitalist have had need for each other's abilities and talents in order to accomplish their common goal.

It is because that is true that an engineer should be more interested than most men in the preservation and extension of the system of private venture capital and the freedoms of thought and action which are associated with it—and only with it.

To be sure, socialism in its various forms has occasionally represented a temptation to some engineers. Many an engineer has chafed a little at the necessity of tempering his design to meet the needs of the market place, to make it commercial. There is attraction to the idea that almost anything can be done in engineering if cost is not a factor. And socialist governments are notorious for embarking on projects without regard to cost.

That attraction, however, is only a snare. Practically, if we examine the philosophy which underlies the various forms of socialism, it is a philosophy in direct contradiction to everything the engineer believes.

The engineer believes in the inquiring mind. His work is directed toward a new and better solution of problems. If any man is an apostle of constant change, it is the engineer.

The socialist, on the other hand, is an apostle of things as they are. What are the slogans under which socialists operate?

"We will divide up the wealth," they say, "so that the common man will get more."

"To each according to his need," was the early communist slogan.

"Fair shares for all," is the slogan of British socialism today.

Now notice, please, that the emphasis in all these is on dividing up what already exists. Nothing is said about producing more. Nothing is said about developing new products and services or improving the existing ones. Not at all. The socialist is concerned only with the allocation of existing production. For all practical purposes, he assumes that the product or the service is already perfect and only needs to be spread around in a different way.

It is an ironic situation. The socialist who says he hates capital is unwilling, once he gets control, to risk the destruction of existing capital by the introduction of new products and processes. It is only the so-called reactionary private capitalist who is willing to let go of what he has and take his chances on the new idea providing something better.

The history of socialists societies shows that they are always failures at production. In my opinion, their undue reverence for existing capital, once they get control of it, is a major reason for their failure.

Socialist Production Fails

There are at least two other major reasons why they fail.

One is that they do not and cannot give free rein to the individual genius of their people. When production is planned by government boards, the spirit of progress withers. When governments have the power to assign men to jobs, few men will fit their assignments.

It is inconceivable to me that a Henry Ford, for example, could be produced by a socialist state. For Mr. Ford's achievements could only have been attained by an unfettered individual, and one immediate effect of Mr. Ford's work was to destroy vast amounts of existing capital in industries which were made obsolete by the mass production of the automobile. It is true that the automobile created enormously greater new capital and new employment but we appreciate that contribution only by hindsight. It was not foreseen at the time he began his work and would certainly not have been foreseen by the political managers of a socialist state.

The third great reason for the economic failure of socialist states has been their failure to offer adequate individual incentives for performance. On many occasions, they have sought to substitute fear as an incentive instead of the hope of individual reward but it has not worked. Historically, such slogans as "fair shares for all," have meant in practice smaller shares for everyone.

The number of such failures is very great, but the socialists, communists and other collectivists nevertheless bring forth their plans as if they were something new and promising. Several of those experiments that failed have taken place in our own country.

As far back as 1607, in the Jamestown Colony, they tried the idea that government should control production and distribute the products equally. After years of failure, they gave up and assigned several acres of land to each of the colonists, to work as his own.

The famous Captain John Smith, one of the leaders of the colony, reported the results of this change in his General History of Virginia. And this is what he wrote, more than 300 years ago:

"When our people were fed out of the common store and labored jointly together, glad was he could slip from his labor or slumber over his task, he cared not how.

"Nay, the most honest among them would hardly take so much true pains in a week as now, for themselves, they will do in a day. Neither cared they for the increase, presuming that howsoever the harvest prospered, the general store must maintain them—so that we reaped not so much corn from the labors of 30 as now three or four do provide for themselves."

So the incentive to individual effort, the hope of reward, is important to production. It was then and it is now. It will always be.

Now, for all these reasons, as I have already indicated, the engineer has a particular interest in the preservation

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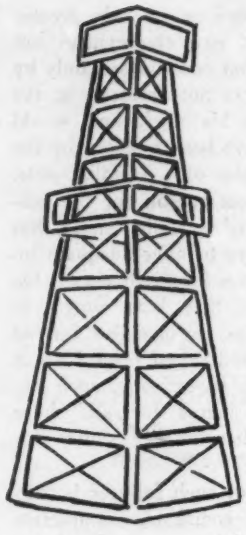
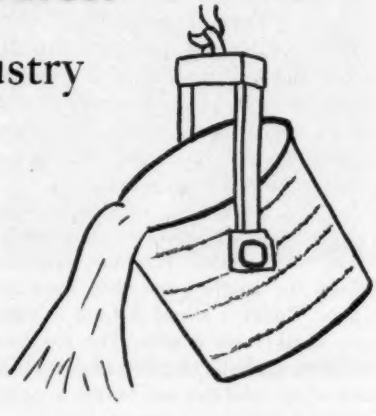


Your Business and Mine

The Petroleum Industry Is Assured of Resources by the Steel Industry



in a Talk Before the American Petroleum Institute

by Benjamin F. Fairless

President of U. S. Steel Company

The petroleum industry faces a number of very important and difficult problems to which you have been devoting your discussions, (editor's note: of the American Petroleum Institute); and there are, I believe, certain differences of opinion among you as to how these problems should be solved. I see by the papers that the coal people are trying to get the Government to cut down on the transmission of natural gas; and some of the gas people feel that the Government should set up a separate agency to deal with their needs apart from those of the oil producers. The oil producers, of course, face their perennial problem of the depletion allowance, and then there are a few little items like the imports of foreign oil, the export of pipe, the spacing of wells, and how to manufacture enough al-kay-late to make all of this new, high-powered aviation fuel that the Government is going to need.

Now I should like to tell you just what to do about each of those problems; but I cannot. It is true, of course, that we in the steel industry have received a great deal of free advice from outside sources recently, and I feel sure that you can get the same kind of advice, if you want it, for exactly what it is worth.

But NOT from me. Unfortunately, I am one of those quaint, old-fashioned industrialists, who believes that the other fellow knows a whole lot more about running his own business than I do; so I am just going to have to let you struggle along, in your own magnificent way, contributing to the growth and defense of America as your industry always has throughout the ninety-one years of its life.

In these days of half war and no peace, however, our two industries face many problems that are your business *and* mine; and it is about these that I want to talk. Specifically, I want to discuss some of the problems in my business, so that you may judge their probable effect upon yours.

Steel and Petroleum Industries Closely Bound

No two industries in America, I suppose, are more closely allied than petroleum and steel. There was a day, of course, when you built oil derricks out of wood, and when we used tallow to lubricate our machinery in the steel mills; but those days are gone forever.

Today your derricks are of steel, your drills are of steel, your cables are of steel, and from the moment oil starts flowing from its underground prison till it reaches its final destination, it is encased in steel. Our nation's supply of oil, therefore, depends in large measure upon the availability of steel.

Similarly, our national supply of steel depends upon the availability of oil. Most of us think of steel as a coal-burning industry, and it is, for it uses more than a hundred million tons of coal each year. But to produce a year's supply of steel, we must also burn more than two billion gallons of fuel oil, and half a trillion cubic feet of natural gas.

So it is our business to see that your business gets the steel that it needs. We have met this obligation successfully in the past; and we propose to do so in the future.

Now the present supply of steel has been the subject of much study and criticism during the past few months. Every

fact that has any possible bearing on the problem has been widely published and discussed; and it would be pointless for me to review. I should like to summarize the facts, however, in this way:

Steel Supply More-Than-Meets Minimum Needs

There is not enough steel, at present, to satisfy the maximum *wants* of everybody; but there is a great deal more steel than is necessary to meet America's minimum *needs*. Today we are producing more steel than we have ever produced before, at any time, in any emergency; and beyond that, we are expanding our steelmaking capacity more rapidly than ever before in history — nearly twice as fast, in fact, as we did during World War Two.

During that war, as you will recall, the steel industry built everything that it could, as fast as it could; and the Government stepped in and built steel plants of its own; but it took the industry and the Government, working together, nearly *four* years to build as much new steel capacity as the industry alone will now build in these next *two* years, without Government participation.

And right here, I want to emphasize one point. Expanding the production of steel is not merely a matter of working an extra shift, or installing a few new machines. Steel plants, by reason of the nature of the operations they perform, have to work twenty-four hours a day, seven days a week; and when new capacity is needed, it has to be built all the way back to the mines. New sources of iron ore have to be developed, new coal pits opened, and whole new transportation systems may have to be created to assemble these raw materials. Large tracts of land must be purchased, great buildings constructed, huge furnaces bought, and millions of pounds of machinery, to roll and finish the steel, must be installed. Then come new power plants and fuel lines, while thousands of men are assembled and trained to run the new plants when they are ready.

Expansion Plans Continue as Industry Grows

It is a tremendous undertaking; and the fact that we are now able to attempt this incredible program of expansion, is due in large part to the fact that the steel industry has spent many weary years and many millions of dollars in planning, in research, in the discovery of new ore deposits abroad, and in the search for a practical method of extracting the iron from the low-grade taconite ores which are so plentiful here at home. Our industry, like yours, has never stopped expanding in its history, and it has never stopped planning for further expansion. It will grow just as long as America grows, and just as much.

That is why I wonder, sometimes, about some of these "estimates" that I have seen recently, purporting to show exactly how many tons of steel America will need in some future year. Now "estimate" is only a silk-hatted word meaning "guess," and one guess is as good as another. But I am impressed by the fact that some guesses can be very much taller than others; and the estimates I mention are growing so tall that they sound like the stories that were told out here in the early days of the Gold Rush, when the men used to sit around the campfires at night, indulging in the most outrageous flights of fancy. History records that there was one old miner called "Windy," whose inventive imagination surpassed all the others. No matter how tall a story they told, he could always top it. But one day, poor Windy had to abandon his art forever. He had begun to believe his own stories.

Now I have no doubt that the authors of these estimates believe in them most sincerely, and I have no quarrel whatever with their conclusion that America is going to need more than 110 million tons of steel. My quarrel is with their apparent assumption that the steel industry is going to *stop* at 110 million tons.

Nothing, of course, could be further from the truth. Long before the end of 1952, when our present program of construction is completed, more new plans will have been announced and more new projects undertaken. And so it will go, for one thing is certain: unless something compels it to do so, the American steel industry will never relax its present expansion efforts until it is able to produce every pound of steel that it has any prospect whatever of selling; and whether that balance occurs at 110 million or 130 million tons, is a relatively unimportant statistic.

Until that balance is reached, however, the steel supply will be tight, tight enough, probably, to cause considerable inconvenience in many industrial fields; but not tight enough, certainly, to work any serious hardship upon our civilian economy, as long as the available steel is used judiciously and effectively where it will be of the greatest advantage to everyone.

That is true in the oil industry, as elsewhere. At the request of the Government, a committee of the National Petroleum Council has prepared and presented an estimate of the petroleum industry's probable steel requirements during this year and next year.

Now, unfortunately, our industry does not classify its sales of steel in the same way your industry classifies its purchases, so it has not been possible for our marketing experts to determine just how far your estimated wants will exceed our capacity to supply them. Therefore, I shall not attempt any detailed analysis of the report. I would like, however, to discuss it in broad and general terms.

Every year since the war, we have been able to supply you with more steel than you used the year before. Not only that, but we have sold you a larger percentage of our total steel production with each passing year. Steel industry records show that "Oil and Gas Drilling (including Oil and Gas Jobbers and Construction)" took about two and a quarter times as much steel last year as was shipped for this purpose in 1946, four years previously. And that's fine. We like it.

But as we read it, the NPC Committee's report calls for a great deal more steel next year than your industry used last year—considerably more, in fact, than will be available. It would seem to me, therefore, that no useful purpose can be served by regarding this report as the final, absolute and untouchable word on the subject, and I feel certain that its authors did not intend it to be so regarded.

(*Continued on Page* 25)

What Happened At The

barnyard jambourie

Midst barnyard bedlam, 149 frolicking farmers and their wives capered about the WSE homestead (all three floors of it) at the Society's first social evening of the year on November 20th.

The live stock was penned in the south forty (dining room alcove to the city folk who couldn't come down for the get-to-gether), and ranged from a grumbling gobbler to a drowsy old pig who wouldn't utter an oink, with a flock of ducks and a shy gray rabbit pitched in for animal atmosphere. And in the north forty, hungry hands stowed away turkey dinners with all the fixin's.

Dinner was cleared away, chores were done, and it was time to dance, time to sing and time to join in the games. Couples squared away, dos-a-dosed, twirled their partners with a grand right and left until they vowed they'd sleep clean through the rooster's crowing next morning.

While up in the parlor the singing had commenced. The neighbor girls (members of the Sweet Adalines, Inc.) had dropped in to pay a call, and were leading and harmonizing just as purty as a row of jay birds down in the hollow. On the other side of the parlor another group played 20 Questions, a new fangled city game the Chicago cousins brought with them when they stopped by for a visit.

Quicker than a cricket's chirp, it was time for the prize awards. The grand door prize was the tom turkey, fully feathered and still gobbling. The other prizes included the ducks and chickens, but the pig was kept to fatten up a bit. The live animals proved a mite of a problem to the winners, so some were auctioned off, the money to be used toward a cow for the next party.

During the evening, folks came from all parts of the county to see the new barn, the well and windmill. The wall papered farmyard had been built overnight with the help of the Architect's Club artists. The well-mannered animals, the wholesome meal, the songs, square dancing and games were all due to the hardworking hands on the committee, W. R. Marston, Dot Merrill, Margaret Griesel and Ray Clark, with Loren Tuttle and F. J. Dittrich the foremen.

Here's WSE's

Recipe for an Ideal Thursday Noon

1. **Take a generous portion of good food (for just $1.15)**
2. **Add a dash of an entertaining speaker (different subjects every week)**
3. **Pour in a large part of society fellowship (don't skimp, there's more)**
4. **Mix well and you have**

WSE's Luncheon-Meeting

Every Thursday from 12:15 to 1:30

WSE Members Receive Bell Promotions

WSE members with the Illinois Bell Telephone Company have recently come in for a number of much deserved promotions. Top promotion of a WSE member was revealed last month when William V. Kahler was elected president of Illinois Bell. Now three more members have received advancements in the Bell system.

First on the new list of promotions of WSE-IBT men is the one of O. G. Smith. Mr. Smith is the newly appointed Chicago Area chief engineer for Illinois Bell. O. G. was formerly plant extension engineer with IBT.

O. G. Smith

Although he works diligently for Illinois Bell, Smith does not limit his activities to the Bell system. He is a central figure in the Chicago civil defense program as chairman of the communications committee for the Chicago Civil Defense Organization. Even though there are not many free hours left when O. G. finishes his telephone and defense business, he manages to serve as chairman of a Western Society committee and participate in many of the Society's activities.

O. G. Smith, after graduating from Armour Institute of Technology with a B.S. degree in Civil Engineering, began his career as an engineer in charge of construction in the Bridge and Building department of the Illinois Central Railroad. In 1926 he joined Illinois Bell as an engineer.

Smith became a member of the Western Society of Engineers in 1935. He has served on a number of committees since that time, and has been chairman of the House committee, and is at present chairman of the Headquarters committee.

Next in the promotion picture is Daniel K. Chinlund, former commercial personnel supervisor and newly named plant extension engineer.

Daniel Chinlund

Chinlund, a 1938 graduate in Electrical Engineering from the University of Illinois, went to work immediately with Illinois Bell as an installer. During World War II, his Bell career was interrupted for the rank of a lieutenant colonel with three years' service in North Africa, Sicily and Italy.

Mr. Chinlund joined the Western Society of Engineers in 1947, and has recently moderated the Junior Division's seminar series on "Profits and Survival."

Third change of WSE members in the Bell system is that of H. I. Romnes. Mr. Romnes, former chief engineer of Illinois Bell's Chicago Area was recently appointed general manager of the Long Lines Department, American Telephone & Telegraph Company in New York.

H. I. Romnes

Romnes started his telephone career while attending the University of Wisconsin. He worked both as a construction man and station installer for the Wisconsin Company in the summer of 1927. In 1928, he was employed by the Bell Laboratories. Seven years later he went to the toll transmission group of the AT&T, O&E Department, taking charge of the group in 1945. His rise was rapid, late in 1946 he was appointed radio engineer, and was named plant extension engineer in 1949. In 1950 he came to Illinois Bell as equipment and building engineer and several months later was named chief engineer.

Mr. Romnes became a member of WSE in 1950.

Another promotion of a WSE-IBT man was announced in October, 1950. LeRoy F. Bernhard, formerly cost studies engineer, was named plant extension engineer.

Bernhard received his B.S. in Electrical Engineering from Armour Institute in 1929. Mr. Bernhard started young in the telephone business. During the summers when he was in college, he was employed by IBT in a number of jobs.

After graduation he worked as an engineer in the Transmission Division of the Chicago Area, until he was transferred to the Chicago Area Commercial Department as commercial representative, salesman, engineer and Public Office manager.

LeRoy Bernhard

In 1939 he was transferred again, this time to the State Area Engineering Department where he has been engineer, toll cost studies engineer, and cost studies engineer.

Bernhard is another IBT employee with many outside activities. He was technical director of the "Looking Ahead" exhibit at the Chicago Fair of 1950. He is a member of the board of direction of Western Society and active on many of its committees.

memos on WSE members

W. R. Marston

W. R. Marston, who is serving as WSE program chairman during the current year, will take over as president of the Lincoln Park Kiwanis Club for 1951. Mr. Marston was appointed deputy city traffic engineer for the city of Chicago last February, as the first step by the city in enlarging the Bureau of Street Traffic.

Theodore Van Zelst and John Gnaedinger have a new sideline, outside of their regular jobs with Soils Testing Services. Van and John have just organized the Gnaedinger and Van Zelst Labquip Corporation to handle distribution of Tinius Olsen Testing Machine Company products in the Chicagoland area. WSE wishes them both good luck in their new venture. . . .

Wilfred Sykes, chairman of the executive committee, of Inland Steel Company, makes news again, this time in the housing field. He has just been elected treasurer of the Chicago Housing Authority. . . . **Stanford T. Patchie,** formerly Time Study Engineer with Hana Engineering Works is now Industrial Engineer with that firm. . . . A change in company officers, **Richard J. Nash,** is now president of Nash Brothers Construction Company. Mr. Nash was formerly the company's vice-president. . . . **Alfred R. Peterson** is now associated with the firm of Skidmore, Owings and Merrill. Mr. Peterson used to be with the City of Chicago in the department of Subways and Superhighways. . . . **Harry Newman,** a student member, and recent graduate, is now plant manager of Alcor Engineering Company. . . . **Burdette E. Peterson** has been promoted from Plant Manager to Treasurer of Industrial Equipment Company. . . . **Donald G. Storey** is now a Junior Civil Engineer with the Sanitary District of Chicago. . . . and **Anthony J. Strazz,** formerly with Carr and Wright, Incorporated, is a structural designer with the Pure Oil Company.

Another change in officers of companies is **Ben H. Suhr's.** Mr. Suhr, formerly vice-president of Suhr, Beryman, Peterson & Suhr, Incorporated, is now its president. . . . **Arthur J. Watschke** has changed positions. Mr. Watschke is Chief Draftsman of Birthman Electric Company.

Please send us news about yourself, your family, your fellow WSE members. Other members are interested in YOU.

Obituaries

Frank Alfred Randall, a past member of the Board of Direction of the Western Society of Engineers, and a structural engineer who supervised much of the work on the Lake Shore drive in the 1930's, died December 2, 1950 after a short illness.

Mr. Randall, a structural engineer in Chicago for 45 years, helped erect the Sheraton hotel and the Lawson YMCA, and had, for the past several years, been a consulting engineer for the city's subway and superhighway department.

Frank Randall joined the Western Society of Engineers in 1905 and became a life member in 1944. He had served as a trustee and had contributed a paper "Development in Types of Chicago Building Construction" which was published in the 75th anniversary edition of the Journal.

Another WSE member who had long been active in Society affairs, E. H. Bangs, died in December. Mr. Bangs, who died December 3, 1950, was retired at the time of his death. He had been an engineer with Illinois Bell Telephone Company.

Mr. Bangs joined WSE in 1911, and had been a life member since 1941. He served on many committees of the Society, especially during the period from 1934 to 1947. He always maintained a keen interest in the Society's welfare and progress.

Robert J. Bushnell, a Western Society of Engineer's member since 1947, died December 5, 1950. Mr. Bushnell was assistant superintendent of the Service and Meter Department of Commonwealth Edison Company. He graduated from Purdue University in 1933, and was with Commonwealth Edison until his death at the age of 40 years.

Legion Benefit Show Comes to Chicago

The American Legion's professional show, Red, White and Blue, opened at the Chicago Civic Opera House, January 1. Red, White and Blue, with its Hollywood cast of 125 and Dave Rose' orchestra, will be held in Chicago through February 11.

The show comes to Chicago from Los Angeles, where it opened in connection with the national American Legion convention. The national American Legion, in show business for the first time, has put up $300,000 to defray production costs and all proceeds will go to the organization's veteran rehabilitation and child welfare work.

Guest stars at the Chicago showing will include Virginia Mayo and Michael O'Shea, of Hollywood and Broadway. Tickets are priced at: evenings—$1.85, 2.50, 3.10, 3.71, 4.33 and 4.94; Saturday matinees—$1.25, 1.85, 2.50, 3.10, 3.71. They may be obtained at the Opera House box office or Marshall Field's downtown. If you wish to order tickets by mail, make checks payable to Opera House, 20 N. Wacker, Chicago 6, enclosing self-addressed and stamped envelope.

Smoke and Fly-Ash Virtually Eliminated As Air Pollution Problems

Technology is now available to practically eliminate smoke and handle most of the fly-ash problems in air-pollution, according to Hammett P. Munger, who is in charge of air-pollution research at Battelle Memorial Institute, Columbus, Ohio. He said that close coordination between public officers, industry and research organizations is required for the most rapid progress in solving this problem.

Only within the past five years have studies of methods for reducing air-pollution been intensified due to public interest on a national scale, Mr. Munger said. Several millions of dollars are spent annually for research in this field.

Mr. Munger pointed out that in the last analysis, it is the public who will pay for the cleaner air that it breathes; that much of the cost will be recovered by lower crop and property damage and better living conditions.

He said each plant industrial problem must be analyzed individually to secure the most economical solution to the problem.

"The same factors must be studied for a community or metropolitan area as for a single plant," he stated. "Here the problem is made more complex by the many sources of contaminants and by the fact that the air is three dimensional. Many of the newer techniques are directed at solving this type of problem. Even in a community survey it is necessary after studying the overall conditions, to work out the details of reducing air contaminants plant by plant.

"The latest improvements in collecting equipment have been in the newly designed mechanical separators, both wet and dry, and the Venturi scrubber," he said. "In the Venturi scrubber, the water droplets are broken into a very fine mist. This mist is formed by the high velocity of the effluent gas, passing through the Venturi portion of the collector. These very small droplets wet and absorb very small particles by the Brownian movement in the air."

The greatest need of the present air-pollution control program is to find lower cost methods for removing the smaller particles from effluent gases, Mr. Munger stated.

A new device has been developed at Battelle which determines the amounts of dirt fall while the wind is blowing in various directions. Placed in a heavily industrialized area, it is expected to be useful in locating the direction from which large quantities of dirt come.

Newer techniques of study make possible the determination of the concentration of air contaminants at various altitudes as well as at ground level.

Techniques using Kytoons, or kite-balloons, not only permit the measurement of wind velocity and direction up to 500 feet and higher, but also allow the sampling of gases and particulate matter at the same height. Meteorological observations at chimney-top level and higher are important, and may also be taken by this method.

A low-velocity wind tunnel has been used to investigate the part that building design, stack height, gas velocity and wind velocity play in controlling the path of the smoke from the stack.

Most of the work in sampling air-borne-contaminants has been directed toward the determination of the amount and properties of aerosols present, Mr. Munger explained.

"Among the newer developments has been an adaptation of the Venturi scrubber for collecting small amounts of air-borne contaminants from large volumes of air," he said. "From these methods for sampling and determining the properties of aerosols, one may be selected which will be suitable for nearly any of the contaminants encountered in industry."

"Equipment for continuously measuring both 'light' and 'dark' aerosol concentrations in the air is in the design stage. If there is a demand for such equipment, it could be developed rapidly.

"Using this continuous aerosol collector, it will be possible to obtain the variation of the total aerosols present throughout the day and night. It may also be possible to differentiate between

(*Continued on Page* 29)

Crerar Library

News and Notes

"Research libraries never stop growing." This is a disturbing fact to the financial officer who must count the cost in more floor space, more steel shelves, more maintenance. But there has been no way to avoid these growing costs, except by discarding books that may still be requested by researchers. Even in science and engineering, most books retain some value for the history of technology if not for practical use. Hence, the collections of The John Crerar Library have continued to grow like those of other research libraries.

A partial solution to the storage problem came with the establishment of The Midwest Inter-Library Corporation. Organized on March 4, 1949, this new corporation has a library building under construction at 5721 Cottage Grove Avenue. It is scheduled for completion about May 1, 1951, and will be known at The Midwest Inter-Library Center.

Membership in the Center is by institution, and at the end of 1950 included fourteen members: Crerar; Illinois Institute of Technology; University of Chicago; Northwestern University; the state universities of Illinois, Indiana, Iowa, Kansas, Minnesota and Wisconsin; Purdue University; University of Notre Dame; Michigan State College; and University of Cincinnati.

Of special interest to architectural engineers is a new type of steel stack construction, designed by Snead & Company. The standard steel shelves for library stacks are similar to those used in the old WSE library. The new stack design consists of hinged compact storage book cases, set in triple rows of double-faced shelving. The outer cases swing out, section by section, to give access to inner shelves. The result is fifty percent increase in the capacity of the book stacks.

Books in this new style stack are somewhat less accessible than in standard shelving. The new Center, however, is designed to house the less-used books from the member libraries; and the balance in advantages is with the greater storage capacity. The stack unit of the Center now under construction will accommodate 3,150,000 volumes.

CTA Profit Goes Into Improvements

Estimating revenues of $113,466,000 for 1951, Chicago Transit Board recently provided for expenditures totaling $113,381,100, leaving $84,900 to be added to other funds available for modernization purposes.

Passenger fares and miscellaneous transportation revenues were estimated at $111,306,000, and income from other railway operations at $2,160,000.

For transit operating expenses in 1951, the Board budgeted $94,248,600, including $53,181,500 for conducting transportation, $13,353,000 for equipment maintenance, $10,321,200 for electric power and motor fuel, $5,106,000 for damage expense, $1,101,400 for insurance, $1,085,000 for rent of track and facilities and $2,898,400 for administrative, general and legal expense.

Of the $19,217,400 over and above the operating expense budget, the Board ear-marked $18,132,500 to meet other fixed and anticipated expenses. These include pension and social security costs of $4,360,800, bond interest and reserve charges of $5,100,500, depreciation charges of $7,750,000, operating expense reserve of $900,000, and compensation of $1,021,200 to the City of Chicago for use of city streets and city-owned subways.

For capital expenditures from cash expected to be available from 1951 operations, the Board budgeted $8,008,000, including $3,202,100 for payments on recent purchases of 1,050 L-subway cars and buses, $1,252,900 for improvements and additions to car houses, garages and other buildings, $1,234,000 for trolley bus power cables and Electrical Department construction projects, $862,000 for track and track structures, and $460,000 for tools and other shop equipment.

Other capital projects costing an estimated $5,386,000 were listed as desirable but subject to additional financing. These include $2,415,000 for additions and improvements to car houses, garages and other buildings, $1,425,000 for track and track structures, $876,000 for electrical construction, and $570,000 for tools and other shop equipment.

Currently CTA expenditures are based on estimated revenues of $121,542,000 for 1950. Estimated revenues for 1951, showing a decrease of $8,076,000, compared with 1950, reflect the nation-wide downward trend in local transit riding.

The operating expense budget for this year (1950) totals $105,602,174, compared with $94,248,000 for 1951, and the amount for other fixed and anticipated expenses is $15,919,054 compared with $18,132,500 for 1951. The increase proposed in this category of expenditures for 1951 is due mainly to increased pension and Social Security costs, and to increased depreciation charges resulting from this year's purchases of new equipment.

The budget, which was recommended by General Manager Walter J. McCarter, was received, approved, and recommended to the Board by W. C. Gilman & Company, of New York, independent consulting engineers, retained to advise the trustee of the Authority's outstanding bonds.

Your Pet Project MAY BECOME A PRIZE PAPER

FOLLOW THESE RULES. GET A COMPLETE SET FROM THE SECRETARY

WIN CASH PRIZES OF $250, $150 or $100

1. Any member of the Society may compete.
2. Papers shall not be highly technical in nature, but of general interest to engineers (not political or controversial).
3. Contact the Secretary as early as possible and not later than February 1, 1951.
4. Papers must be submitted to the Secretary for acceptance by April 1, 1951.
5. Accepted papers will be judged on originality, editorial merit and value to the engineering profession.
6. Papers submitted must not have been previously published in substantially the same form.
7. Winners will be announced and prizes presented at the annual meeting of the Society in June, 1951.

Dr. Egloff to Lecture At Edinburgh U.

Dr. Gustav Egloff, 1949-50 president of WSE and director of research for the Universal Oil Products Company has been selected by the academic senate of the University of Edinburgh to deliver its biennial "Romanes Lecture in Chemistry for 1951."

Dr. Egloff, who is vice-president of the Third World Congress, will attend its meeting in the Hague, May 28 to June 6, and lecture on the "Polymerization of Olefinic Hydrocarbons."

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Chicago Industries To Invest $5,137,500

Chicago area industrial firms in November announced plans for investment of $5,137,500 in new factory facilities and acquisitions of land or buildings, according to Leverett Lyon, Chief Executive Officer of Chicago Association of Commerce and Industry.

The November figure for industrial expansion in the Chicago area is approximately 80 per cent below the investment of $27,409,000 for which plans were announced in October, Lyon said. He added that an unusual number of important construction projects were reported to be under study, but these were not yet ready for official announcement.

Total private investment represented by announcements during the first 11 months of 1950 was $289,218,500. These plans have been supplemented during the year by government projects estimated at $16,000,000.

Some of the larger investments among those announced by 35 firms during November were:

Bell & Gossett Company in Morton Grove, is making substantial expansions to its plant. Several buildings are involved, one of which contains 50,000 square feet, and a laboratory containing 13,000 square feet.

Anderson Company, manufacturer of automotive equipment in Gary, is adding a one and two-story section of 30,000 square feet to its plant.

Central Steel & Wire Company, 300 West 51st Street, is adding to its works a building of 70,000 square feet. Construction is scheduled to start immediately.

Brock & Rankin, national book publishers and producers, now at 619 South La Salle Street, have leased 29,000 square feet on two floors at 732 South Federal Street.

J. Calvin Brown to Speak at ASME President's night

J. Calvin Brown, national president of ASME, will be the guest speaker at the President's Night dinner on Thursday, January 18. The reception will be held at 6 p. m. with dinner at 6:30 p. m. Special awards will be distributed to ASME members.

A luncheon and travelogue will be sponsored by the Women's Auxiliary of the Chicago section on Friday, January 26, at 12 noon in the English Room at Field's. "Inside Passage to Alaska" will be the subject of Mrs. Frank P. Lawler's talk, which will be illustrated with colored slides. The second subject will be "Resume on a Trip to Europe" by Mrs. Alexander Cowie.

On Tuesday, January 30, at 7:30 p. m. in the auditorium of 84 E. Randolph, John E. Ott, executive vice-president of Acme Steel Company will speak on "Metal Stitching—With Demonstration and Explanation of Specific Jobs". Mr. Ott will be assisted by two members of the Acme Steel Company staff, Mr. A. G. Denne and Mr. E. P. Grimes.

Everyone is welcome to the affairs of ASME, please make advance reservations at ASME headquarters at 400 W. Madison St., or call for reservations at FI 6-2990.

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W. W. DeBerard Urges North Side Filtration Plant

W. W. DeBerard (WSE), city engineer of Chicago, recently stressed the need of a filter plant in the event of atomic attack. Mr. DeBerard contended that construction of the proposed 80 million dollar water filtration plant should be launched promptly so that Chicago's water supply would be protected in an atomic raid.

The city, park district and state have approved the 61 acre site in the lake north of Navy pier, but the army secretary must also give his approval, according to an 1899 federal law which provides that obstructions to navigation cannot be constructed without army permission.

Warning of trouble if an atom bomb were to fall near a city water intake, DeBerard said that a filter plant could protect the water by removing radioactive materials. Mr. DeBerard continued, "There is talk about building garages to serve as bomb shelters. Comparatively, they would protect only a few people. This filter plant would protect two-thirds of the population of Chicago."

The proposed plant would provide 950 million gallons of filtered water daily and serve all of the city north of 39th street. The section south of 39th street is served by the south district filtration plant at 79th street and Lake Michigan.

Mr. DeBerard stated that contracts could be let within 90 days for construction of the coffer dam to surround the plant area and for a new water tunnel to lead from the plant area to the north side. He said that he thought the plant could be completed in six to seven years.

Financing for this project is already partially provided. The city has authority to issue 12 million dollars of water certificates and after January 1, 1952, can issue an additional 50 million dollars. It is expected that, once the army approves the plans, the city will seek federal aid. The federal government helped finance the construction of the south district plant.

Another need for filtered water is illustrated every winter by the murky drinking water on the north and northwest sides. The principal cause has been high wind which churns up sediment from the lake bottom. The proposed plant would filter out this material.

New Cargo Aircraft Nearly Eliminates Disassembly

The Douglas C-124A, Globemaster II, is the first and only cargo aircraft in existence which can transport practically any type of military cargo without disassembly, S. S. Kreisler, preliminary design engineer for the Douglas Aircraft Company, Long Beach, California plant revealed.

Mr. Kreisler presented a detailed analysis of the capabilities of the Globemaster II, designated C-124A by the United States Air Forces, for which the airplane is being produced in quantity.

The C-124A, at its design gross weight of 175,000 pounds, could transport a payload of approximately 50,000 pounds 850 statute miles with ample allowance reserve fuel and return without refueling, he declared. The equivalent range is 1,570 statute miles. At greater alternate gross weights, payload and range can be greatly increased, said Mr. Kreisler.

The C-124A represents a new departure in design collaboration, having been developed by the Air Forces in conjunction with the Army Field Forces, to assure that the airplane met the qualifications of both services.

The Globemaster II, said Mr. Kreisler, can carry approximately 94 per cent of the vehicles listed in the standard Military Vehicle Catalogue, without disassembly. Among the many items of useful, bulky cargo which the C-124A can contain and lift, he said, are the largest types of bulldozers, scrapers, and graders; light tanks, such as the M-24, or the T-37, which have a fighting weight of 40-50,000 pounds, and guns such as the 155 mm. "Long Tom," the 8-inch gun, or the 240 mm. howitzer on a transport wagon.

Through the use of self-contained loading-ramps, traveling hoists, auxiliary floors and a loading elevator, it is quite possible for the C-124A to transport simultaneously a M-24 tank and a two-and-a-half-ton truck or, if desired, three fully-loaded two-and-a-half-ton cargo trucks, the Douglas engineer said.

The heavy payload capacity and long-range ability of the C-124A suggests utilization for large-scale air movements of infantry or paratroopers. A fleet of 80 such aircraft could, in one flight, transport all the personnel of an entire 16,000-man airborne division from the vicinity of Boston, Mass., to the area of Brest, France, with but two refueling stops. This loading would permit each man an on-board gross weight of 240 pounds and would require no refueling at destination. A simultaneous trip, with an additional 80 Globemaster IIs, could transport 2,500 tons of divisional equipment.

For air evacuation use, the C-124A has accommodations for 127 litter patients plus 25 seats for attendants and ambulatory patients. Litters may be rapidly loaded or off-loaded by using both ramps and the loading elevator.

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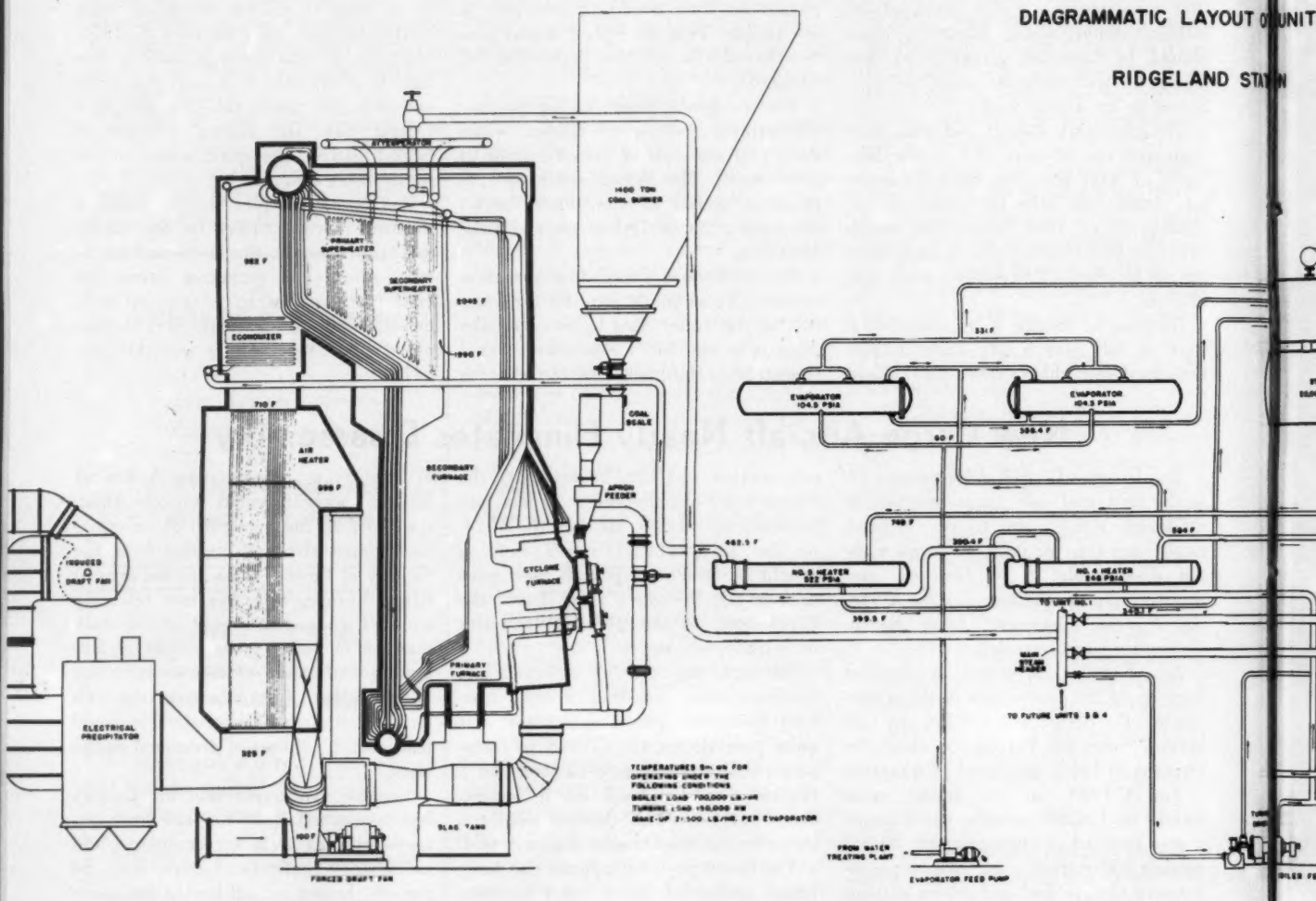
Ridgeland . . . *New Trend In*

DIAGRAMMATIC LAYOUT OF UNIT

RIDGELAND STATION



On Dec. 7, 1950, the Commonwealth Edison Company of Chicago dedicated its first completely new generating station in over twenty years. Ridgeland Station, occupying a 96-acre tract on the Chicago Sanitary and Ship Canal, is designed so that it can be enlarged to permit the installation of an ultimate capacity of 600,000 kilowatts. Preliminary work on the station was started in August 1947, and the first 150,000-kilowatt unit was placed in service in October, 1950. The second 150,000-kilowatt unit, now under construction, will be in service by 1951. When the third unit, now scheduled to see service in 1953, is added, the building will require extension. The first Ridgeland unit brings the total net plant capability of the system to 2,802,000 kilowatts.

The Ship Canal is an excellent site, serving as a source of condensing water and also permitting the unloading of coal. Fuel for Chicago stations is supplied from the central Illinois coal fields and arrives at Ridgeland by rail or barge.

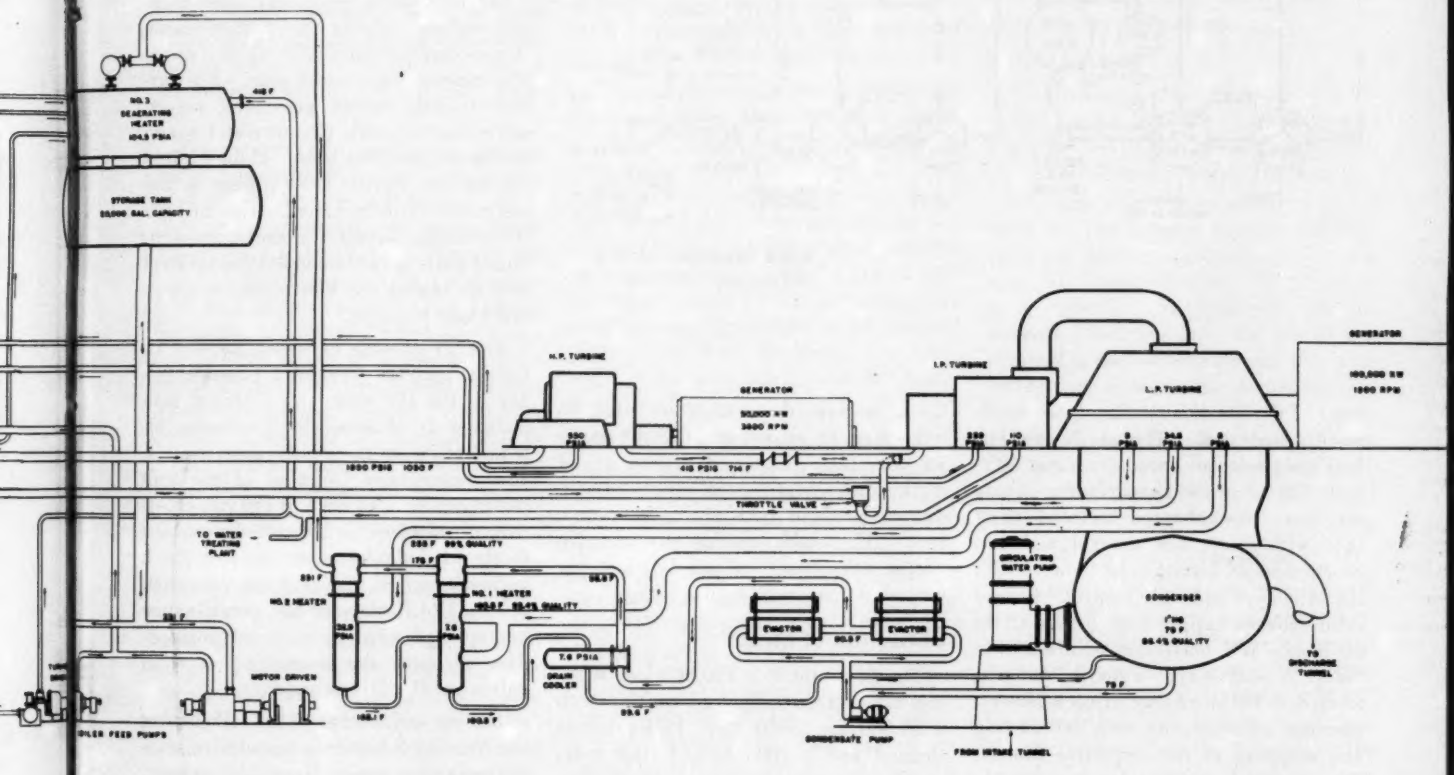
Operating at rated load and design conditions of 1800 pounds per square inch, gauge; 1050 degrees Fahrenheit (F) throttle steam, 1-inch mercury back pressure, and 460°F feedwater, the first unit has an expected heat rate of 10,203 B.T.U. per kilowatt-hour sent out. Boiler efficiency at this rating is 87.5% without auxiliary power charged. Total unit auxiliary power is about 7%.

Several outstanding features of the Ridgeland Station are: first, its architectural concrete and aluminum side wall construction; second, its short stacks with high discharge velocities due

nd In Generating Stations

YOUT OF UNIT NO. 2

ND STATION



to proximity to an airport; third, its cyclone furnaces with bin system of firing; fourth, the central control of boilers, turbine-generators, auxiliaries and power distribution; and fifth, the central control of coal handling plant. The first part of this paper discusses only the first unit.

Use Cyclone-fired Steam Generators

The Babcock & Wilcox cyclone-fired steam generators, two per unit, are each rated at 730,000 pounds per hour at 1900 pounds per square inch (psi) and 1050° F. Four-hour maximum rating is 770,000 pounds per hour. Spray attemperators between the primary and secondary sections of the pendant superheater provide the temperature control. The primary superheater section is counter-flow and the secondary is parallel flow. The horizontal cyclone furnaces, four per boiler, are supplied with crushed coal from the 1,400-ton boiler bunkers through individual scales and apron feeders. The scales, being subject to high primary air pressure at times, are mounted in pressure-tight housings with clean sealing air supplied to the mechanism compartments. Natural gas and coal can be burned in the cyclones in combination or alone. Fuel feed and combustion air quantity are automatically proportioned in each cyclone. Molten slag is tapped continuously from the inclined cyclone furnaces into the primary furnace and from the primary furnace continuously through floor taps to two quenching tanks.

The tubular air heaters are divided into two sections, making the replace-

Ridgeland

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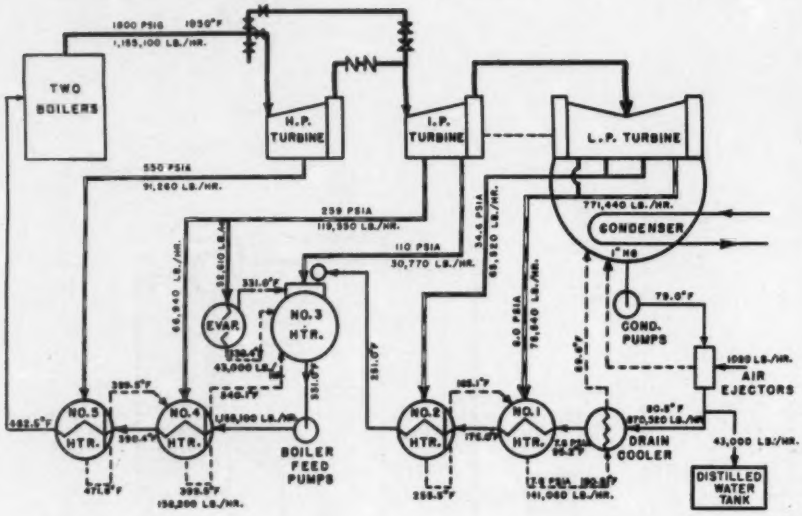

FLOW DIAGRAM – UNIT 2
RIDGELAND STATION

ment of the low temperature tubes much more economical. The air heater has four gas passes and provides air at 600° with 325° F stack temperature. There are two constant-speed induced draft fans with inlet vane control and two constant-speed forced draft blowers with inlet silencers and vane control. Forced draft blowers supply combustion air at 60 inches WG maximum to a common duct. A sealing-type butterfly damper, located in the discharge of each blower, operates automatically with the starting and stopping of the respective blower. The common air duct leaving the air heater divides into four branches, one for each cyclone, with individual metering of air for control purposes. Automatic sequentially operated soot blowers with air as the blowing medium are located in the superheater economizer, and in the air heater.

In the relentless attempt to reduce atmospheric pollution, Cottrell electrostatic precipitators have been installed to supplement the cyclone firing method, in order to reduce the discharge of stack solids. The Cottrell precipitators are located between the air heater and induced draft fans. The stack height was limited to 213 feet above ground by the CAA, because the station is only two miles from an airport and directly under an air lane. Expected discharge of stack solids under normal operating conditions is about 0.11 grains per cubic foot. The stack nozzles provide discharge velocities of about 120 feet per second at maximum boiler rating.

Utilization of Steam

The first unit is a 150,000 kw, Westinghouse, cross-compound turbine with a 50,000 kw, 3600 rpm, high-pressure element and a 100,000 kw, 1800 rpm, tandem intermediate pressure-low pressure element. Both generators are designed for operation at 85% power factor, hydrogen cooled at 0.5 psig. With 15 psig, hydrogen, the rated capability of the unit will be 15% higher or approximately 203,000 kva. The rated voltage is 13.8 kv.

Steam at 1800 psig and 1050° F is admitted to the high pressure (HP) cylinder through two double-plug type throttle valves, two steam chests, eight plug-type governing valves, and six segmental nozzle blocks. There is no stage by-passing under overload. The HP cylinder has one impulse stage (two rows) and 13 reaction stages with one extraction point. The IP cylinder has 27 reaction stages and two extraction points. The LP cylinder has 10 double-flow reaction stages and two extraction points. Each of the two elements, HP and IP-LP, has its independent turning gear, oil reservoir, and set of oil pumps. In addition to the shaft-mounted centrifugal pumps for governing and lubrication, there are a steam-driven governing and lubrication pump and two motor-driven lubricating pumps for each element. These pumps start automatically in the event of oil pressure failure.

The main steam header and other high-temperature piping is hollow-bored, chrome-molybdenum (2¼% chromium, 1% molybdenum) steel pipe. The turbine throttle valves, governing valves, steam chests, nozzle chamber and nozzle blocks are stainless steel. Hobbs joints connect the ferritic steel piping to the austenitic throttle valves. The turbine HP cylinder except for the afore-mentioned parts is chrome-molybdenum steel and all blades are Westinghouse standard blade material.

The by-passing of steam to the IP turbine throttle provides a possible outage of the HP element. Reduced temperature is obtained by increasing attemperation at the boiler superheaters. This necessitates isolation of the unit steam header. In each of the two cross-over pipes, from the HP cylinder exhaust to the IP cylinder inlet, are two check valves in series. During the operation of the IP-LP element the check valves are spring-loaded in a closed position. This obviates the necessity for relief valves on the HP cylinder.

During such outage of the HP element the Number 5 heater is inoperative since its extraction comes from that element. This reduces feedwater temperature from the normal 426° F to 390° F and increases the turbine heat rate from the normal expectancy of 8,150 B.T.U. per kw-hr to 10,475 B.T.U. per kw-hr. Removal of the HP element from service necessitates an outage of the complete unit in order to open the clips in the HP generator leads.

The Allis-Chalmers condenser is of the single-phase type with divided water box. Either half can be inspected or cleaned during low-load operation. The two water circuits are in opposed direction with shut off valves at inlet and outlet

(*Continued on Page* 19)

Ridgeland

(Continued from Page 18)

and at interconnecting valves between the bores, so that flow can be reversed in either half for flushing. Two motor driven, submerged, vertical, centrifugal circulating water pumps are used in the system, each with a capacity of 77,500 gallons per minute. Chlorine is injected into the station inlet tunnel for intermittent de-sliming.

Inter-and-after-condensers of the two twin-element, two stage, steam jet air evactors, use condensate as the coolant. Three three-stage, centrifugal condensate pumps are used, although two pumps are adequate for normal full load of the unit.

Five stages of feedwater heating provide a final feedwater temperature of 460° F. The two LP heaters are of the vertical, straight tube type with an integral drain sub-cooler. The two HP heaters are of the horizontal, U-tube type with similar sub coolers. The deaerating heater is located 75 feet above and supplies the boiler feed pumps. Two of the three boiler feed pumps are adequate for a full turbine load. One pump of each of the first two turbine units is readily interchangeable between units for outage or emergency.

Water is Supplied by Lake

Water used for make-up and general needs is obtained from Lake Michigan, about 10 miles from the station. Because this supply might at times be completely interrupted, two 200,000-gallon underground reservoirs have been provided for such emergencies. Since this is also the source of the station drinking water, chlorine is injected by flow proportioning, and residual in the reservoirs is recorded.

Make-up water is pretreated and distilled in two 25,000 pound per hour evaporators in the unit cycle. The pretreatment consists of filtering, hydrogen cation exchange softening, degassing, caustic neutralization and deaeration. Plans for installing a complete demineralization plant are being considered. After the initial start, the pretreatment system is automatic. Four 50,000-gallon tanks provide distilled water storage for two units. The distilled water used in the initial start of the first unit was trucked from other stations.

Conveyor Belt System Handles Coal

The coal handling plant consists of facilities for receiving coal by barge or rail; handling to and from storage; breaking and crushing for the bin system of cyclone firing; and delivering the crushed coal to the boiler bunkers. The system at present consists of a series of single belts with a handling capacity of 800 tons per hour. The ultimate coal handling system will consist of parallel belts which empty into hoppers. Cross ties fitted with directional dampers permit the transfer of coal to other sets of belts going in various directions. This arrangement provides a high degree of flexibility to the coal handling system.

Coal is unloaded from barges by the traveling bridge crane equipped with a seven and a half ton bucket. It is discharged to either of two parallel belts which in turn discharge the coal to underground belts. Coal can also be discharged from a rail car dumper onto the underground conveyors. Cars of 100 ton capacity and 51 feet in length, over couplings, can be dumped in a 95 second cycle which does not include car moving. These cars are moved by motor driven cable.

The coal is next transported to the breaker house where it is reduced in size to 1¼ inch minus by the breakers and further reduced by hammermill crushers, so that 95% of the coal is ¼ inch minus. Fines can be screened and by-passed around either breakers or crushers. The crushed product is then delivered to the 1,400-ton boiler bunkers.

Under the traveling, dockside bridge crane, with its 283-foot, ½-inch span, is a coal storage pile. Coal can be unloaded from barges directly onto the pile by using the crane bucket, or it can be discharged to storage by means of a traveling stacker. Stored coal is reclaimed by the crane bucket or by bulldozing to a ground level hopper above the underground conveyor.

To serve other stations from this storage point, a traveling barge loader is used on one of the parallel dockside belts. At the present time, the under-crane storage pile is being constructed and is expected to hold 325,000 tons of compacted coal. A second dockside storage pile is now being considered. This pile would be served by a tower-type crane and the coal would be reclaimed by another dockside belt supplying the existing underground belt.

Conveyors, breakers, crushers and various feeders and valves in the handling system are remotely controlled from a central control room. A miniature system on the control panel indicates the routing of coal and equipment in service. Interlocks provide sequential starting and emergency sequential stopping of the various pieces of equipment. Equipment such as barge mover, crane, stacker and loader, car dumper and car puller are adjacently controlled, while an intercommunication system coordinates the operations.

Ash Handling

Slag is intermittently sluiced by a hydrojet system from the quenching tanks (two per boiler) to an outdoor storage pit. This system is manually controlled.

Fly ash also intermittently removed from the precipitator hoppers (16 hoppers per boiler) is transported pneumatically under vacuum. After mixing with water in the multi-water-jet air ejectors (Hydrovactor), the ash is discharged to the outdoor storage pit. This system has an automatic sequential control.

Ash, slag and fly ash is dredged from the outdoor storage pit by clam shell buckets and loaded onto rail cars or trucks.

Control System Centralized

Control of boilers, turbines, generators, major auxiliaries, auxiliary power, and transmission for all units is centered in a single control room. This room is 40 feet by 96 feet at present, but will be extended to 160 feet in length and will be almost centrally located in the final building structure. The room is air conditioned and maintained under a slight positive pressure for cleanliness. Types of illumination were thoroughly studied before choosing the fluorescent tubes above the egg-crate ceiling. This lighting is designed to give a choice of 50 or 100 foot candles on the bench boards.

Boiler controls are located on one side of the room and corresponding turbine-generator controls are positioned on the opposite side. Transmission, auxiliary power, and station auxiliary controls are located at the eventual center of the room. In general, all of the

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Ridgeland

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instruments are installed on vertical back panels, and the controls are located on bench boards. Since the control room is as much as 350 feet distant from some of the items it controls, it was necessary to select control systems and remote instrumentation methods with minimum lag characteristics. Pneumatic relaying and electric or electronic telemetering is used extensively throughout this system. Steam, combustible gases or high pressure fluids are not allowed to enter the control room.

The combustion control and boiler feed pump control are Republic Flow Meters Company's newly developed electronic control adapted to pneumatic actuaters. Each boiler has two drum level gauge glasses, one of which is televised to the control room by Utiliscope. This is supplemented by a Bailey Meter Company's telemetered drum level recorder which is a component of the three-element feedwater control. Use of alarms and automatic protective devices is much more extensive than in previous installations. Loss of ignition in a cyclone furnace is immediately indicated by a photoelectric cell actuated alarm. Audible alarms on the annunciator system are installed only in the central control room. These alarms are grouped into major and minor systems. Large "area" trouble lamps appear on sections of the control board to facilitate the location of individual trouble lights. The use of motor-operated valves is also very extensive.

In general, the following operations can be performed by remote control: Cyclones can be fired and boilers can be put in service except for drain valve operations. The turbine is brought to speed by an attendant at the unit and is controlled, thereafter, remotely. Major auxiliaries such as circulating water pumps, condensate pumps, boiler feed pumps, turbine oil pumps, and exciters are remotely controlled. Emergency operations such as: sectionalizing steam and feedwater heaters, by-passing coal scales and feed-water regulators, isolating feedwater heaters in event of leaks, and transferring boiler feed pumps from one unit to another, can be done remotely.

Use Two Intercom Systems

The station has two public address systems supplementing normal telephone service, one for the coal handling plant and another for the station generally. The two systems consist of 68 microphones and 115 speakers with provisions for additions. There are a total of 12 power amplifiers, each with 150 watts maximum output. Speakers are dispersed throughout the buildings and about the property as are necessary to provide complete coverage. Generally, microphones are located at strategic spheres of equipment operation and near speakers. A unique feature of the installation is a carrier current system from the bridge crane to various parts of the coal handling system.

Electrical System Inadequate for Local Use

The new Ridgeland station is located in a suburban area that has an adequate distribution system for its local load. Therefore, no station bus at generator voltage is required, and all power will be fed directly into two 69-kv transmission systems. This is done for each unit through the two transformer banks, each consisting of three 13.2-69 kv single-phase transformers with a combined phase transformers with a combined forced-air-cooled rating of 100,000 kva per bank.

A heavy, isolated phase, metalclad bus connects the two generators of each unit. Extensions of this bus connect the unit to two of the above transformer banks, one bank being connected to each 69-kv system.

The tie between generators permits equal division of generator output between systems and provides a means of holding the two generators in step when they are started as a compound unit. There are no circuit breakers between the generators and transformers.

The transmission terminal consists of two isolated-phase ring buses operating at 69-kv. This was chosen as the transmission voltage so that it would fit in with the existing transmission system of the Chicago area which can absorb the output of the two units of the new station without major additions. Two underground cable lines rated at 140,000 kva and two rated at 100,000 kva will connect the terminal to the existing system. The 69-kv oil circuit breakers are rated at 1200 amperes, with an interrupting capacity of 2,500,000 kva. Insulation testing equipment at the station will provide up to 160-kv for alternating-current tests and 200-kv for direct-current tests.

Each generator is provided with a motor-driven exciter. A third exciter serves as a reserve for the generators of either the high-pressure or low-pressure elements.

Automatic control of generator excitation has been designed for two functions. First, for normal operation, a pre-selected generator bus potential will be maintained under normal load variations. Second, automatic minimum-excitation apparatus will insure stable

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operation with relatively low field currents.

Electric System Feeds Most Auxiliary Power

All auxiliary power is supplied from the electrical system except on turbine-driven boiler feed pump and miscellaneous small auxiliary turbine-driven oil pumps. For each unit, two 8,000-kva transformers are connected directly to the generator leads to provide power at 4,160 volts. Duplicate transformers are connected to the 69-kv bus, so that auxiliary power is normally taken directly from the generators, but may be supplied from the 69-kv transmission system. The transfer is automatic in case of failure in the normal supply. A zig-zag secondary was used on the 13.2-4/16-kv transformers, so that with Delta-Y connection on all transformers, the auxiliary power supplies would be in place.

General station auxiliary power is supplied from the 69-kv system. One 10,000-kv transformer is connected to each ring bus. The load is divided between these transformers on the 4,160-volt side, with an automatic transfer in case either the source or supply fails. Auxiliary equipment, driven by motors of from 50 to 3500 hp., will operate at 4,160 volts; smaller equipment at 208 volts.

Auxiliary Power System

The power system consists of five 4,160-volt substations and ten 208-volt substations. One 4,160-volt substation supplies large station auxiliaries and also the six 4000/208-volt substations for station lighting and miscellaneous small power. Two 4,160-volt and two 208-volt substations serve the power requirements of each generating unit.

The transformers feeding the 4,160-volt system are housed in compartments outside the building wall and are connected to the switchgear by three-phase metalclad bus. Each substation has two parallel rows of switchgear connected by a bus crossing over the operating aisle. All switchgear is of the drawout type. The 4,160-volt circuit breakers are wheel-mounted. The 208-volt circuit breakers and contractors are stacked three high, with monorail facilities provided for handling removable elements. Cable is carried in open troughs in tunnels and in the cable rooms under the switchroom floors. All switchrooms are ventilated with filtered air to minimize the maintenance requirements.

Architectural Features Described

Architecturally, Ridgeland station represents a complete departure from Commonwealth Edison's previous design of generating stations. Lower sections of the outer walls are architectural concrete and upper sections are fluted aluminum panels. The metal walls are pre-fabricated, double-sheet construction with 16 gauge striated aluminum on the outside, 18 gauge zinc-coated steel sheet inside and 1½ inches of insulating fibreglass between. Supplied in approximately two-foot by twelve-foot panels, the panels were welded directly to building steel. Window sash and ventilating louvres are aluminum.

Office and utilities space is at one of the far ends of the building. The 213-foot stacks with "bottle top" contour and banded with red and aluminum were as high as could be erected because of the station's proximity to the glide-path of the Midway airport. Wind tunnel studies conducted at the University of Michigan dictated the stack design and building contour.

Utilize Many Types of Lighting

The roadways on the property are lighted by mercury-vapor, highway type lights of 21,000-lumen capacity. The coal yard and dock area are floodlighted from two 100-foot towers to permit night operation of the coal system.

The turbine room and shops are provided with a combination of incandescent and mercury-vapor lighting. Seven hundred fifty watts of incandescent are used with each 400-watt mercury-vapor fixture. There is an effective light intensity of 25 foot-candles on the turbine room floor. This combination of lighting was found to give a close approximation of daylight.

Obstruction lights on the end stacks are mounted on hinged booms at the nozzle sections and on swivel rings for all stacks at mid section and nozzle sections. Lights are controlled by photocells, and duplicate circuits with automatic throw-over are provided.

Summing up Ridgeland's Features

The new station is representative of the latest engineering advancements of the electrical power industry. Long-range advance planning led to the acquisition of the plant site over 25 years ago. What was then wasteland is now the center of a rapidly growing industrial and residential load area. Structural design made use of the most economical materials and methods available at the time of construction. The output of the station that will be available by 1951 will be readily absorbed in the existing transmission system to satisfy the ever-increasing demand for electric power in the Chicago area.

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Best Land Use, First Redevelopment Plan

The importance of a close collaboration between the Redevelopment Commission and the Planning Commission is particularly evident when changes in the street and highway pattern of an urban area are being considered, according to Seward H. Mott, Executive Director, Urban Land Institute.

He continues that time and again the worst blighted areas are found immediately adjacent to the Central Business District. This is the district that is frequently in slow transition from residential to commercial and where there is a hodge-podge of mixed uses.

Under a well conceived Redevelopment Program, the highest and best use of the land must be the first consideration.

Emphasis on housing, due to Federal Government subsidy, has blinded many to the more important and appropriate uses to which the redeveloped area should often be put.

A study of many cities found blighted areas lying two or three blocks from the main street and frequently paralleling it. Richmond, Virginia, and Dallas, Texas, are typical examples.

Such blighted areas surrounding the central business district are ideal locations for an inner loop highway system that feeds customers into the retail area and moves through traffic around it. This inner loop need not necessarily be a freeway or limited access road.

Inner highway loops around central areas are now being planned in many cities—Chicago; Detroit; Richmond, Virginia; Cleveland and Cincinnati, Ohio—to mention a few that have such programs well under way.

In addition to the more efficient movement of traffic, locations along the loop are ideal for parking, lying as they do only a few blocks from the business and shopping district. These facilities could be either at ground level or multi-story garages.

Origin and destination surveys of traffic moving into the central area will indicate not only the proper location for such parking facilities, but the width of roadway needed, the placement of traffic interchanges, traffic lights, and other control features.

The providing of such a highway facility alone, may well be all that is needed to stimulate the rehabilitation and redevelopment of the adjacent land by new and existing owners without further use of public funds. As an example: the removal of the elevated tracks on 6th Avenue, New York, was all that was necessary to change the uses of its frontage from pawn shops and cheap employment agencies to high-class retail stores—with greatly increased front foot values and higher tax return to the city.

If a sound redevelopment program can be worked out using the hundreds of thousands of dollars invested in existing streets, so much the better; every reasonable effort should be made to do this. The Indianapolis program is an excellent example of this type of realistic planning, where sound structures are being rehabilitated instead of torn down. However, it will frequently be found wise to close certain streets entirely in order to provide large blocks for parks, schools, industrial or housing purposes.

Another excellent use of central city blighted areas that benefits all citizens and improves traffic conditions is its use as an inter-urban or local bus terminal. Tied in with a proper loop highway, this keeps the big through buses off the main business streets and yet provides a convenient and adequate terminal.

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Attention Section and Program Chairmen

The Octave Chanute medal is awarded to the best papers in Civil, Mechanical, Electrical and General engineering presented before the Western Society of Engineers. No speakers have received this award since 1948. The chairmen of the various sections are urged to tell their general meeting speakers about the medal, the front of which is pictured above, and ask them to submit their papers to the Executive Secretary either before, or on the date the paper is to be given before the Society.

The first award was presented during 1901 by Octave Chanute, during his term of president of Western Society. The present design of the medal was adopted in 1913 and each medal bears the profile of Mr. Chanute on one side and on the opposite side is the year of the award, the name of the recipient, the branch of engineering and the date the paper was presented.

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February 10, Excursion to Plastic Plant

WSE members and guests will inspect the Chicago Molded Products Corporation plant at 1020 N. Kolmar Ave. in Chicago, from 9:30 a.m. until 11:30 a.m. This is the largest independent plastic molding plant, and a pioneer in plastics covering the design and building of molds, use of materials and finishing, inspection and testing of plastic products. Call RA 6-1736 for reservations.

February 12, Use of Structural Aluminum

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Mr. Ernest Hartman, chief research engineer of the Aluminum Company of America, will come from Pittsburgh to address WSE members on the "Uses and Properties of Structural Aluminum." Mr. Hartman has been in charge of the physical testing of structural aluminum for the past 25 years.

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Looking Ahead

(*Continued from Page 5*)

and extension of the system of private venture capital. It is the system under which your profession has attained its present high rank. It is the only system, I believe, under which you can retain it.

I will not labor the political implications of that fact nor seek to point a moral with regard to present political behavior in our nation, in a partisan sense.

But this much can be said—the current of socialism which swept over large areas of the world has overflowed also into our country. It has been visible in the attitudes and pronouncements of public men in both parties and among voters of both groups. I hope and I believe that Newton's third law of motion will apply to this action and that there will be an equal and opposite reaction. But in the meantime the pressure is here and it is real.

We see the pressure of socialist ideas in taxation, where laws seem to have for their very purpose the prevention of the formation of new capital in private hands and the diversion of all financial control to the federal government.

We see the pressure of socialists ideas in the assault on profits as such, with no apparent understanding that profits and losses are the governor of an economic system, calling new capital to the areas where the public most wants it to be used, and withdrawing capital from the areas where the public least wants it to be used.

We see the pressure of socialist ideas in the notion that the rights and claims of labor are somehow superior to the rights and claims of the investor or the customer, and that every advance in production should be immediately distributed in increased wages.

As I have said, I believe these ideas are false. I believe the good sense of our people will eventually recognize them as false. I hope that recognition will come soon.

In the meantime, however, they are hampering. They place new burdens on industry as it goes about the ancient job of trying to serve its customers, its stockholders and its employes and serve them all well. New burdens of cost are imposed. Higher levels of prices inevitably follow those costs. The market is narrowed by the higher prices. And capital and labor alike are threatened by the result.

And as each of those things happens, the socialist thinkers who cause them to happen cry ever more loudly, "See. The system of private capital is no good. The government must take over."

That situation, it seems to me, puts a special duty on you engineers. For while we await the equal and opposite reaction which will restore balance to our economy, we must fight off this creeping tide of higher costs. That is a burden which rests on all management, but it rests especially on designing and production engineers.

This is no new duty for the engineer. Your lives have been spent in the pursuit of the twin gods of engineering—a better product and a lower cost. All I am saying to you is this: that there is a special urgency now to your quest.

If we are to preserve our system of private venture capital against its enemies, we must do so by continued and increased proof of its advantages over any other system and its ability to provide greater benefits for the average man, even under adverse and hostile conditions.

That can only be done through our products and our services. And every product, and many of our services, begin on the drafting board of the engineer.

Looking ahead, then, I believe I see great new responsibilities for the engineer. Looking backward at your history of accomplishment, I am sure you are equal to the task.

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Your Business and Mine

(Continued from Page 7)

If, however, this report is looked upon as the careful, conscientious, preliminary survey that it is, and if it is used as the basis upon which to reconcile our ability to produce steel with your ability to consume it, then it is clearly a document that will be extremely valuable to both of us.

We believe there will be no shortage of steel for oil country goods, provided that none is diverted into inventories. Your need for barges and tank cars is being determined, of course, under the Government's allocations program. It is apparent, however, that your requirements for pipe lines and for marketing facilities, as listed in the report, are going to have to be re-examined in the light of the available steel supply.

You may want to consider pooling proposed oil lines into a few, big-inch systems. You may want to inquire into the possibility of spreading the construction of new gas lines over a longer period of time. That is your business. You would know how and where the pipe we can supply can be used to the greatest possible advantage. I wouldn't.

I do know, however, that when the Geneva Steel Company produces an ingot of steel, that ingot can be rolled either into plates for the making of large-diameter pipe, or into sheets for the manufacture of stoves, iceboxes, automobiles, or any of the thousands of other items that are manufactured from sheet steel, but it cannot be used for both.

If too many ingots go into sheets, there won't be enough pipe to bring all of our factories all of the fuel they need, because petroleum this year will be the source of nearly 60 percent of all the power that is used in America. But if too many ingots go into pipe, some factories will have plenty of power, and nothing to use it on.

U. S. Steel Insures Fair Distribution

That is why United States Steel is now setting up, with painstaking care, a well-planned system to insure the equitable distribution of available civilian steel supplies among all of our customers, with particular attention to the essential needs of small business and of new businesses. Under this system, the oil industry will be able to get its full share of civilian steel, over and above those quantities which it will obtain under the Government allocations program.

Let me sum it up this way: both of us take great pride in the fact that not once, during World War Two, did any military project suffer for the lack of oil or of steel. And today, I think I can safely assure you that never in the future will the petroleum industry be unable to fulfill its national responsibilities by reason of any failure on our part to provide the steel that you need.

But having made that statement, I am forced to qualify it by adding two very big "ifs." There will be no shortage of essential steel *if* our plants remain in uninterrupted production, and *if* nothing blocks our expansion program. You can't build new capacity unless you can pay for it; and all the capacity in the world is worthless if your plants are shut down by strikes.

America cannot afford another steel strike. Much of our present difficulty is due to the fact that strikes have cost our nation 29,000,000 tons of steel since V-J Day; and we must not lose any more. But if a strike is to be avoided, and if our tremendous expansion program is to be completed successfully, it is vitally important that all of us understand the economic issues that are involved in the present wage negotiations between the steel industry and the union. To exaggerate some of those issues and to ignore others could have serious consequences to you, to every other user of steel, and to every man and woman who is interested in the survival of America.

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Your Business and Mine

(Continued from Page 24)

So I want to present to you, as simply and as dispassionately as I can, the facts regarding our wage problem. As usual, there are two sets of them, and two sides to them.

Economic Factors Stated

The economic facts are these: steelworkers, like oil workers, are today among the highest paid wage earners in the land, and they have been for many years. Their average hourly pay is substantially higher than that which prevails in all manufacturing industries generally. It may surprise you to know that, at today's rates, a highly skilled worker in our mills can earn more than $12,000 a year. Moreover, the latest Government index shows that the cost of living now is almost exactly what it was on the day when our workers got their last pay increase. So their earnings haven't been decreased by higher prices. And there you have one set of facts.

But recently, a CIO Union official, who is negotiating with one of our competitors in the industry, made this public statement, I quote his words exactly. He said:

"We do not see any point in talking cost of living or anything else. We just want to talk a substantial wage increase."

Well, I think he expressed the union point of view with commendable frankness and accuracy—which brings us to the second set of facts, or the practical facts, as they might be called. And the practical facts are these:

Whether we like it or not, the fifth round of wage increases is already well under way in this country. Government studies show that, during the month of September alone, more than 1,500,000 workers received wage boosts. Men in top-paying industries all around us, in automobiles, in oil, in rubber, and in many others, have already had a raise this year, but our steelworkers have not. So our men can't see why they should be discriminated against, and, frankly, neither can I.

Our wage discussions with the union have now been in progress for a whole month, and there is certainly no disposition on my part to ignore the practical facts I have just described. On the contrary, if the union demands can be brought to a point where they will conform substantially to the general wage pattern that has prevailed so far in round five, I have no doubt that a satisfactory agreement can, and will, be reached.

But any discussion of wages necessarily entails a discussion of prices. And here are the plain, unvarnished facts about that:

United States Steel has not raised its prices, generally, this year; yet the cost of many of the major ingredients of steelmaking has gone up enormously. When we found it necessary, last December, to announce a very modest price increase, amounting to less than $4 per ton, it caused an outburst that nearly blew the new roof off of Congress; yet so far this year, the price of tin, for example, has gone up a thousand dollars a ton, and I haven't heard a peep out of anybody.

So it has been with almost everything else. U. S. Steel buys many thousands of things from outside sources, and I have just made a check on ten of them: scrap, refractories, fuel oil, palm oil, copper, nickel, spelter, tin, aluminum and zinc ore concentrates. Now the price increase in these ten items alone, so far this year, will cost our company 88 million dollars annually. That amounts to $4 a ton on our total steel shipments.

Just what a wage increase would cost depends, of course, on its size; but the cost to U. S. Steel of a 15-cents-per-hour raise, let me emphasize that I am merely picking that figure out of thin air for use as an illustration, the cost of a 15-cent raise would be about 132 million dollars a year when applied to all our

(Continued on Page 27)

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Your Business and Mine

(Continued from Page 26)

employees, as it naturally would have to be. That amounts to six dollars a ton.

So, add these two figures together, without even considering our other rising operating costs, and you find that they alone amount to 220 million dollars a year.

Now we hear it said that the steel industry could easily meet these increased costs out of profits if it wanted to; but that, of course, is just plain silly. That is nearly twice as much money as the owners of U. S. Steel have ever received from us in any year of our entire history. It is more money, in fact, than all the dividends we have paid to all our stockholders in the last two and a half years put together.

But it is not only a matter of dividends. It is also a matter of investment and expansion.

American industry has demonstrated its confidence in the future of this country, by expanding its facilities enormously in recent years, and it has backed that confidence with cash. In very large measure, the money for this expansion has had to come from profits which have been plowed back into the business. Since V-J Day, the petroleum industry has spent ten billion dollars for this purpose. U. S. Steel is only one among more than 200 steel-producing companies, yet it alone has spent more than a billion dollars in the past five years to modernize and enlarge its capacity. And the fact that we must now expand even further doesn't mean that we needed more confidence in America. It merely means that we needed more cash.

How To Pay For Improvements

So far as I know, there are only three ways to pay for new facilities in steel or in any other industry. The first is to plow back your profits, if you have enough profits, and thus pay as you grow. The second is by borrowing the money and paying it back out of future earnings, if and when you get them. The third way is to sell new issues of capital stock, but the amount of stock you can sell, and the terms upon which you can sell it, depend directly upon the size of the profit you are making, and upon your prospects of continuing to make that profit.

Now in spite of all we read in the papers about the "enormous" profits of industry these days, the fact remains that industrial earnings, generally, are not large enough today, and have not been large enough at any time in the past twenty years, to do the job that a profit is supposed to do. That is, to attract the equity capital necessary to finance the expansion that our nation has demanded of us.

You have only to look at the Government's records, the records of the Department of Commerce and of the Securities and Exchange Commission, to find the conclusive proof of that statement. You will find, in fact, that for many years now, the sale of new stock issues has contributed only a tiny fraction of the total capital that American industry has had to invest in new and enlarged facilities.

So no matter what route you travel, reinvestment, borrowing, or new stock issues, you come up against one, undeniable, economic fact that all of us might as well recognize:

Earning Decrease Means Expansion Decrease

Any reduction in earnings means a corresponding reduction in the ability to expand. It is just as simple as that, and if America cannot afford any delay in the growth of our steelmaking capacity, then America cannot afford any reduction in the present earnings of the steel industry.

So if the cost of making steel should rise 10 percent, for example, it would be inevitable, I think, that the price of steel should do likewise.

(Continued on Page 28)

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WSE Applications

In accordance with the By-laws of the Western Society of Engineers, the following names of applicants are being submitted to the Admissions committee for examination as to their qualifications for admission to membership into the Society in the various grades, i.e., Student, Associate, Member, Affiliate, etc. All applicants must meet the highest standards of character and professionalism in order to qualify for admissions, and each member of the Society should be alert to his responsibility to assist the Admissions committee in establishing that these standards are met. Any member of the Society, therefore, who has information relative to the qualifications or fitness of any of the applicants listed below, should inform the Secretary's office, 84 E. Randolph St., RA ndolph 6—1736.

101-82 Edward Gross, Assistant to President, Edward Valves, Inc., East Chicago, Ind.

102-82 Henry C. Borre, 1932 N. 73rd Ave., Elmwood Park, Ill., attending Illinois Institute of Technology.

103-82 Emil F. Nigro, 6952 S. Jeffery Ave., attending Illinois Institute of Technology.

104-82 Harold E. Hovey, Serviceman, Central Exterminating Service, 1305 E. 63rd St.

105-82 George O. Neumann (Rein.), Partner & General Manager, G. O. Neumann & Co., 790 Broadway, Gary, Ind.

106-82 Charles F. Leefeldt, 3140 S. Michigan Blvd., attending Illinois Institute of Technology.

107-82 Porter E. Dix, Assistant Manager Transite, Pipe Dept., Johns-Manville Sales Corp., Merchandise Mart Plaza.

108-82 Ernest L. Abramson, Development Engineer, Aurora Pump Co., 619 Loucks St., Aurora, Ill.

109-82 W. Lionel Claypool, Vice President, Aurora Pump Co., Aurora, Ill.

110-82 Edward E. Zesch, 376 Park Blvd., Glen Ellyn, Ill.

111-82 Donald J. Keigher, Fire Protection Engineer, U. S. Atomic Energy Commission, P. O. Box 6140-A.

112-82 John A. Striepling, 2751 W. Logan Blvd., attending Illinois Institute of Technology.

Your Business and Mine

(Continued from Page 27)

Now I have never been able to understand why prices and wages can rise all around us without causing any great public concern, but that the minute there is any talk of a wage-price rise in steel, a large number of gentlemen jump to the housetops and start shouting that a disastrous inflation will result, and that the country is on the high road to perdition.

Such statements are simply not true. They are based on one of the most stubborn and persistent fallacies that is to be found anywhere in our economic thinking today, the fallacy that, because many of the things we buy are made largely of steel, the cost of steel is a major factor in the price we pay.

That sounds so utterly reasonable, but it is, of course, utterly false. The truth is that the cost of the steel is only a minor fraction of the final selling price of any finished product, even when that product is made almost exclusively of steel.

Take an average automobile, for example. It is mostly steel and it sells for about $1850; but the steel that went into it cost only $170, less than a tenth of the price you pay.

The San Francisco-Oakland Bay Bridge is made almost entirely of steel. The steel cost less than seven million dollars, but the bridge cost more than 11 times that much.

A battleship is only a mass of steel that floats; but the finished ship costs the taxpayers from 12 to 14 times as much as the steel from which it is made.

So a 10 percent rise in the price of steel would amount to less than one

(Continued on Page 29)

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Your Business and Mine

(Continued from Page 28)

per cent on the selling price of an automobile, a bridge or a battleship. It would add less than four cents to the price of a $22 automatic toaster; 60 cents to the price of a washing machine; $1.50 on an electric refrigerator; $1.30 on a gas stove; $7.70 on a farmer's tractor; $17 on your new car; and $37 to the cost of a $10,000 home. Now is that disastrous inflation?

I yield to no man in my desire to prevent inflation. I do not want to see any increase in any price if I can help it; but I think it's high time we recognize two very vital and very fundamental facts: first, that a wage-price rise is the effect, not the cause of inflation; and second, that the direct effect of a wage-price rise in steel would be practically negligible.

The average price of the steel we sell today is just under five cents a pound. To meet a 220 million dollar increase in our operating costs, we would have to raise that price by about one-half a cent. So the problem that we face as we pursue negotiations with the union boils down to this simple question:

How can we best serve the interests of America? By trying to insure the uninterrupted and expanded production of steel? Or by trying to prevent a half-cent inflation?

I do not believe that we can afford to indulge in a "half-penny wise, ton foolish, policy" in times like these. And that we are NOT misled into doing so, is the most important business that I know of at this moment.

It is not just my business. It is America's business. It is both your business and mine!

Armour Scientists Aid Costa Rica Hemp Production

Rope, a vital item in Western Hemisphere defense, is drawing five top-flight scientists to Costa Rica.

The five, all from Armour Research Foundation of Illinois Institute of Technology, are Walter J. Armstrong, assistant director of the Foundation's International Division; Norton F. Gurley, research chemists; John D. Keane, chemical engineer; William B. Bobco and Frank MacFall, both research design engineers.

The objectives of the research program, authorized by Congress and undertaken upon request of the Reconstruction Finance Corporation, are to aid in hiking the output of Manila hemp fiber in Central America by increasing production efficiency and to develop new uses for waste products from the process. Manila hemp is derived from the abaca plant—a plant related to the one that sprouts bananas. The United States now relies heavily upon the Philippine Islands as a source for this fiber.

The Armour scientists left Chicago November 19 to spend two weeks in Costa Rica at plantations operating under United Fruit Company management. Following this initial survey, their technological finds will be put to use in this and other Central American countries.

Air Pollution Problem

(Continued from Page 12)

the 'dark-colored' aerosols, which are tarry or carbonaceous particles, and 'light-colored' aerosols, which represent fly-ash and similar materials. With the continuous collector, it may also be possible to correlate wind direction with aerosol concentration."

Tubing Production Book Available

"Descriptive Terms — Steel Tubing," a twenty-page, pocket-size booklet presents brief descriptions of terminology used in the manufacture and application of steel tubing. As the meaning of many of the terms used by the tubing industry is more specific that the ordinary definition of the term, the booklet will be of interest and value to anyone connected with the production of items using tubing. Known as Bulletin TB-335, it is available on request to The Babcock & Wilcox Tube Co., Beaver Falls, Pa.

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Book Browsings

Books Available at WSE Headquarters

Manuscript-Proof Instructions

Author's Guide for Preparing Manuscript and Handling Proof, written and published by John Wiley & Sons, Inc., New York, N. Y., 1950, 80 pp., $2.00.

In the year 1807 the New York City directory listed Charles Wiley, printer and bookseller. In the intervening years the firm of Wiley has not only published certain masterpieces of American literature, but it has stood out as a publisher in the engineering field. Fifty years ago this reviewer was studying books by Wiley which were approved by this school of engineering. More recently in reviewing many books for publication in these columns, he has found that if a book has been published by Wiley, that is assurance of merit. In view of the broad experience in the publishing field of this firm, it follows that this most recent edition of the "Author's Guide," is a treatise which may be used with confidence.

The symbolic notation of mathematics, chemistry and physics has become more and more complex, production costs have rapidly risen, other difficulties of printing and publication have developed. It is more necessary than ever before that close cooperation and understanding between the author and the publisher be secured, if an engineering book is to be excellent in physical treatment and still remain within an acceptable selling price. This book covers in a clear, concise and orderly manner the numerous steps in publishing a book. It will also be of value to those preparing a scientific paper publication.

E. B., W.S.E.

Stress Analysis Handbook

Handbook of Experimental Stress Analysis, by M. Hetenyi, Editor-in-Chief, published by John Wiley & Sons, Inc., New York, N. Y., 1950; 1077 pp., $15.00.

This is a unified and comprehensive presentation of all existing experimental methods for the determination of mechanical strength, written by 31 top-ranking stress analysts, organized by the editor-in-chief, under the aegis of the Society of Experimental Stress Analysis.

It is divided into 18 chapters, each dealing with a principal method, from mechanical, optical, electrical, and photographic gages to X-ray analysis, or a major topic of interest, such as residual stresses, interpretation of service fractures, or analogies. In addition to these, an appendix is devoted to the discussion of fundamentals, dimensional analysis, and the precision of measurements.

The book is replete with illustrations and diagrams. A full bibliography is included at the end of each chapter, and a complete index at the end. It will be of great value to engineers, designers, and students, in the fields covered.

H. F. W., W.S.E.

Basic Electrical Measurements

Basic Electrical Measurements, by Melville B. Stout, Prentice-Hall, Incorporated, New York, 1950, 504 pp., $7.75.

This is primarily a textbook in the Prentice-Hall electrical engineering series. The author, who is a professor of electrical engineering at the University of Michigan, has attempted to cover the field of electrical measurements from the absolute determination of units to the simplest kind of everyday measurement, and also to select the methods that are most important and most frequently used in present-day practice.

In the first part of the book, the author discusses the mathematical aspects of measurement under the headings of procedure, errors, and computations. A short bibliography follows each chapter, indicating numerous sources for more extended study along cognate or supplementary lines.

H. H. F., W.S.E.

Hydrology, Brought Up To Date

Hydrology by Daniel W. Mead, McGraw-Hill Book Co., Inc., New York, N. Y., 1950; 728 pp., $7.50.

Daniel W. Mead, due to his prominence in the advancement of engineering and his many services to the profession which included the office of President of the American Society of Civil Engineers, and his long membership in the Western Society of Engineers, well earned the distinction of having been made an Honorary Member of this society. During the years following the original publication in 1919 of "Hydrology," Dr. Mead collected much additional data on the subject. This has now been incorporated in this second revised and enlarged edition by the author's son, Harold W. Mead and by Henry J. Hunt who worked with the author at the University of Wisconsin.

This reviewer has found Dr. Daniel Mead to be profoundly concerned with the avoidance of errors in engineering design by the use of ample and reliable basic data. In this book on hydrology he repeatedly points out the need of sound engineering and lists and describes projects which failed due to incorrect fundamental assumptions.

"Hydrology" treats of the laws of occurrence and distribution of water over the earth's surface and within the geological strata. It also deals with water's sanitary, agricultural and commercial relations. It is the foundation on which a wide range of major engineering projects are built. The coverage of this book is comprehensive, well selected and authentic. Discussions of the various subjects are clearly worded and sufficiently complete. In the present edition the many chapters including lists of data have been enlarged and brought up to date.

E. B., W.S.E.

Book Browsings

Tips on Accident Prevention

Accident Prevention Administration, by Frederick G. Lippert, McGraw-Hill Book Company, Inc., New York, 1947; 159 pp., $2.25.

The author does a good job of selling his thesis that accident prevention is a necessary function of top-level management. He avoids the word *safety* as being intangible, and the term *injury prevention* as being nebulous, but accidents are definitely bad and should be prevented. Accidents destroy materials, and may even cause loss of limb or life. The causes are varied, and some causes are more preventible than others. The unpreventible, or Act-of-God, class comprises only about 1 or 2 percent of all accidents.

The first half of the book is concerned with Principles and Procedures, while the second half is devoted to Operating Techniques. Then there is the syllabus of a 5-hour conference course in industrial accident control for supervisory people. The conference leader is given a plan to follow in arranging the meeting room, the conferees, and the properties for his demonstrations, all to the purpose of making the most effective impression and orienting the supervisors from their usual reticence into self-willed cooperation with the leader. In other words they take over under guidance of the leader, develop the answers to problems, coach and criticize each other, and then go out to put their own virtually self-taught ideas into effect. Such methods have been successfully used by many companies, and this part of the book probably can be used beneficially by any company regardless of size. The author believes that it should be relatively easy to eliminate 50 percent of all accidents by going to work immediately on the most preventible classes. This book is one of the McGraw-Hill industrial organization and management series.

H. H. F., W.S.E.

Treatment of Primary Batteries

Primary Batteries, by George W. Vinal, John Wiley & Sons, Inc., New York, 1950; 336 pp., $5.00.

Dr. Vinal is chief of the Division of Electrochemistry in the National Bureau of Standards. He has written many professional papers, and also a companion volume on storage batteries. The present book covers the history, theory, materials, chemistry, manufacture, and operating characteristics of primary batteries. Such a book could not be written until recent data had been derived through new research tools, which have been used to study the effects of battery discharge and of inactive storage. Also new developments in weight, size, and type of batteries have been induced by important new uses, as for military purposes, meteorology and communication.

After rather complete treatment of the long established types in use for the past 50 to 100 years, and including the ubiquitous dry cell (of various formulas), the author goes on to several new and highly specialized types of batteries having hitherto unusual characteristics, such as: the ability to operate at extremely low temperatures; or to deliver extra large currents, even in excess of the usual storage battery of comparable size; or to remain inactive for long periods until desired to operate (without any so-called shelf loss, or deterioration).

Any persons working with electrical standards, and involved in the very precise measurements required therewith, will undoubtedly find, in the long and thorough chapter on standard cells, matters of especial interest. This is partly because the author has for 25 years been in charge of the primary standard of the volt in the United States.

H. H. F., W.S.E.

Traffic Specialties Highlighted

Traffic Engineering Handbook, 2nd edition, prepared under direction of the Traffic Engineering Handbook Editorial Board By Henry K. Evans, editor; published by Institute of Traffic Engineers, New Haven, Conn. 1950; 514 pp., $6.00.

The Accident Prevention Department of the Association of Casualty and Surety Companies collaborated in publication of this volume, as the association did previously in 1941. The second edition is an entirely new book reflecting current knowledge and practices. The editorial board of 7 traffic engineers was assisted by 16 contributing authors, and by various other experts.

Like every good engineering handbook, this is a large compilation of specialized reference data. The early chapters contain considerable historical and statistical material which would be hard to duplicate from original sources. Drivers, pedestrians, highways, highway intersections, highway lighting, vehicles, vehicle operation, accidents, traffic, traffic studies, and traffic control, all have their places in the 16 chapters. Naturally traffic management and roadway design for city and country get relatively large space. The pedestrian's safety, and special facilities for his use are given a fair share of space. Many subjects are given background treatment of the customary handbook type, but traffic specialties like traffic signal lights, for instance, are given more detailed explanation. The glossary of traffic engineering terms will answer many questions, and also help promote standardization in a new science that has made great strides since the first traffic engineer in history was appointed about 1921 for the state of Ohio.

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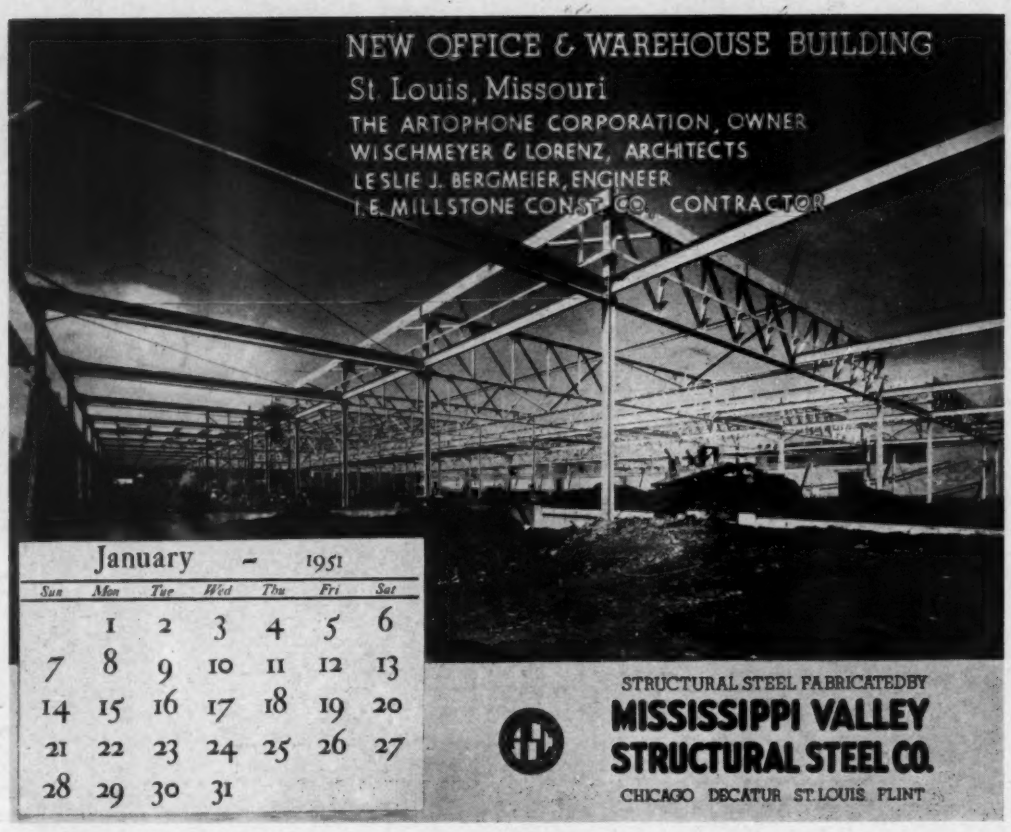
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